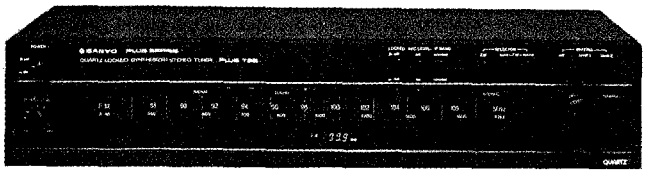
SERVICE MANUAL

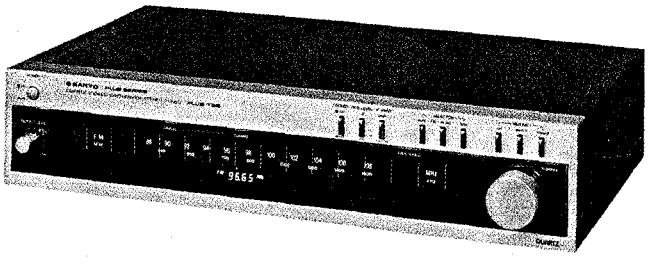
AM/FM STEREO TUNER

SANYO

PLUS T35

(EUROPE)





SPECIFICATIONS

FM Section	
Frequency range	87.5 – 108MHz
Usable sensitivity (at Mono)	1.8μV
Signal-to-noise ratio	
at Mono	75dB
at Stereo	70dB
Harmonic distortion	
at Mono	0.09%(wide), 0.15%(narrow)
at Stereo	0.1%(wide), 0.2%(narrow)
Frequency response	20Hz –15kHz(+1.0/–2.0dB)
Alternate channel selectivity	55dB (wide), 80dB(narrow)
Capture ratio	1.2dB(wide), 1.8dB(narrow)
AM suppression	60dB
Stereo separation at 1 kHz	48dB(wide), 42dB(narrow)
Spurious response rejection	80dB
Image rejection rario	70dB
IF rejection ratio	90dB
Muting threshold	
at level 1	5μV
at level 2	15μV
Antenna input	300 ohms balanced 75 ohms unbalanced

AM Section	
Frequency range	510 – 1605kHz
Sensitivity	
at ferrite bar antenna	300μV/m
at external antenna	30μV
Signal-to-noise ratio	46dB
Selectivity	35dB
Image rejection	50dB
IF rejection	45dB
Antenna	Ferrite bar antenna External antenna
General	
Power requirements	AC: 115/220V 50Hz
Power consumption	16W
Dimensions	Approx. 440(W)x270(D)x88(H) mm (17-3/8"x10-11/16"x3-1/2"
Weight	Approx. 5.5kg(12 lbs. 2 ozs.)

*Specifications subject to change without notice.

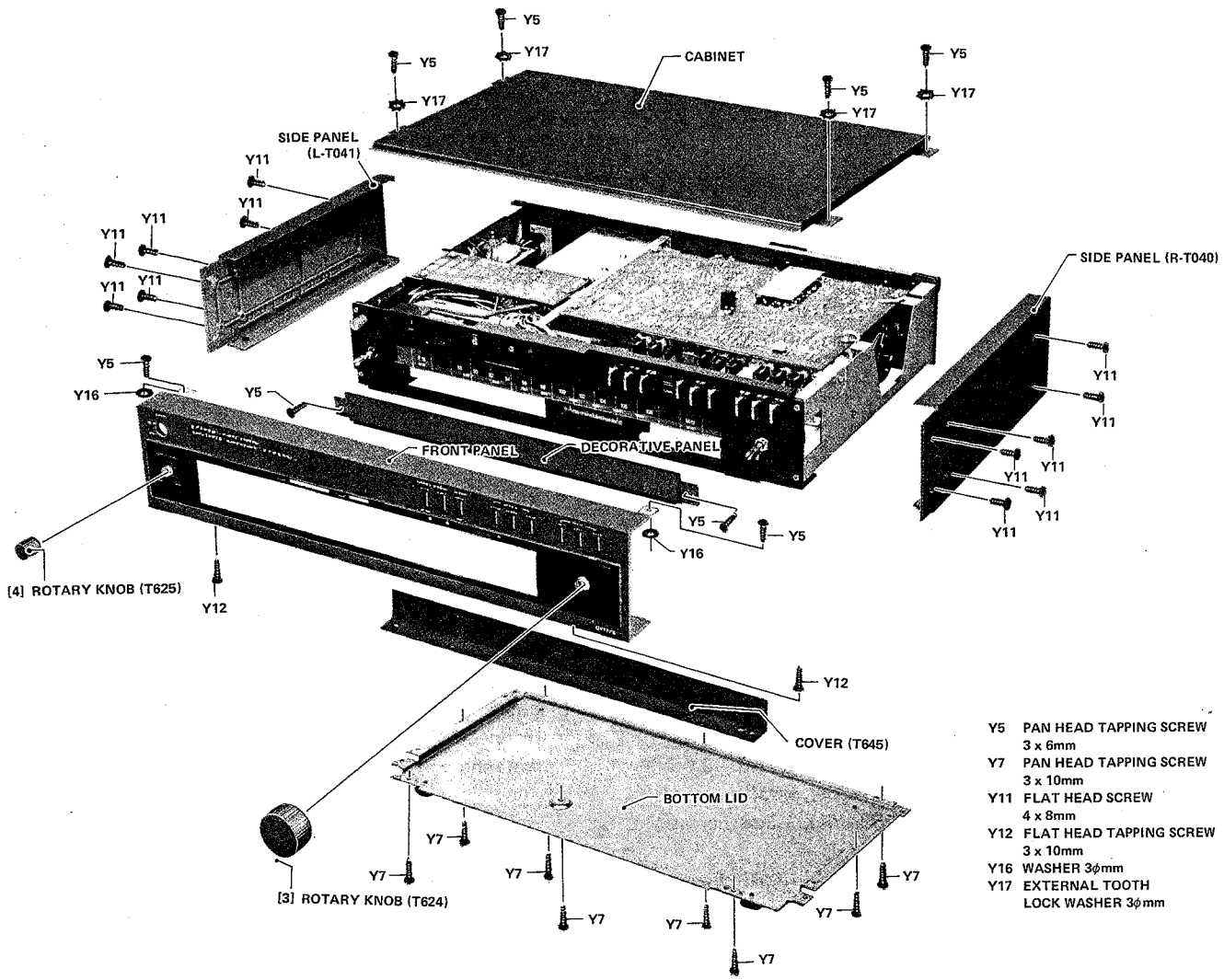
HOW TO DETACH THE CABINET AND CHASSIS

1, How to detach the side panels
Unscrew 12 screws (Y11) (Flat head, 4x8mm), in total, that are fastening the left and right side panels.

2, How to detach the cabinet
Unscrew 4 screws (Y5) (Pan head tapping, 3x6mm), in total, that are fastening the cabinet together with washers (Y17) (Tooth lock, 3mmϕ).

3, How to detach the front panel
a) Pull out the TUNING rotary knob (3) and OUTPUT LEVEL rotary knob (4), two in total, to detach them.
b) Unscrew 4 screws (Y5 and Y12) (Pan head tapping, 3x6mm and Flat head tapping, 3x10), in total, that are fastening the front panel. At this time, pay attention to 2 washers (Y16) (3mmϕ) found between the front panel and the body set. (Washers are provided to the said screws (Y5), not screws (Y12).)
c) Unscrew 2 screws (Y5) that are fastening the decorative panel.

4, How to detach the bottom lid
a) Unscrew 8 screws (Y7) (Pan head tapping, 3x10mm) in total, that are fastening the bottom lid.
b) At this time, detach also the cover together with the bottom lid.



Y5 PAN HEAD TAPPING SCREW 3 x 6mm
Y7 PAN HEAD TAPPING SCREW 3 x 10mm
Y11 FLAT HEAD SCREW 4 x 8mm
Y12 FLAT HEAD TAPPING SCREW 3 x 10mm
Y16 WASHER 3ϕmm
Y17 EXTERNAL TOOTH LOCK WASHER 3ϕmm

INSTRUMENTS USED FOR ADJUSTMENTS

This set is specified by high grade of standard, especially in distortion and carrier leak, as compared with the conventional receivers. Therefore, the instruments used for various adjustments of this set should be of high quality and high grade, and always serviced and adjusted strictly.

FM SG	Output, more than 50 dB; high grade of standard.
Stereo modulator	Strictly calibrated in phase; high grade of standard conforming to the level of FM SG.
AF OSC	20 Hz to 15 kHz, level within ±0.1 dB, low distortion (less than 0.01).
Distortion meter	For automatic level; measurable up to 0.05%.
IHF filter	Distortion less than 0.02% (at 100 mV to 1.5 V), S/N more than 80 dB.
19 kHz band pass filter	More than 40 dB/oct, 38 kHz attenuation (more than 60 dB).
Frequency counter (with AMP)	Input level in the vicinity of 76 kHz, possible at 0.5 mV; small input capacity (cable), less than 50pF; high input impedance, more than 500K ohms (at 76 kHz); displayable up to 76,000 kHz.
DVTVM (digital VTVM)	Resolution less than 1 mV (DC).

NOTE

- Use high quality IHF filter, otherwise the center "0" point may not coincide with the minimum distortion point in the tuning meter center "0" adjustment.
- If the phase of the stereo modulator is calibrated by means of ordinary oscilloscope, an error may be caused. Hence, the phase calibration should be performed strictly.

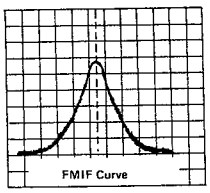
FM IF ADJUSTMENT

1. V-curve adjustment

(1) Connect TP-14 (hot) and TP-15 (earth) to the output terminals of sweep generator, and TP-3 (hot) and TP-6 (earth) to the input terminals.
(2) Connect 300-ohm balanced type resistance IHF filter dummy between the output terminal of the sweep generator and the set. And connect 100-kohm IHF filter between the input terminal and the set.
(3) Disconnect ceramic capacitor C220 (0.022μF).
(4) Reduce the input level of the set as small as possible so that the output waveform may not be saturated.
(5) Adjust T201 so that the waveform of sweep generator attains the maximum without being distorted.

NOTE

Match the center of V-curve with the center line of the ceramic filter being sued.



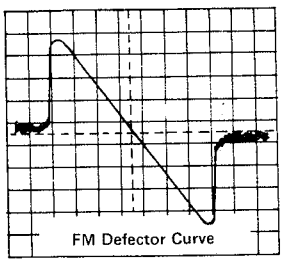
2. S-curve

(1) Connect TP-14 (hot) and TP-15 (earth) to the output terminals of the sweep generator, and TP-7 (hot) and TP-6 (earth) to the input terminals.

NOTE

In order to cut the direct current at the hot side of the sweep generator, connect a capacitor (1μF/16V) between TP-7 and input terminal.

(2) Turn T202, T203 until the waveform of sweep generator attains the maximum without being distorted.



FM TRACKING

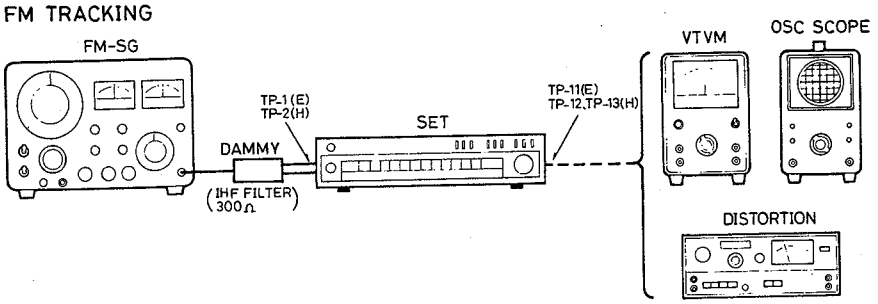
Set FM SG as follows: modulation frequency 1kHz, frequency diviation 75kHz DIV. (100% modulation).
Flip the MODE switch of the unit to "MONO".

* The total load impedance of the testers connected to the unit at the TP12, 13 and ground should be 100K ohms.

(1) Make LOW TRACKING adjustment by means of L102, L103 and L104. Use 90MHz FM signal for this purpose.
(2) Make HIGH TRACKING adjustment by means of CT3, CT2 and CT1. Use 106MHz FM signal for this purpose.
(3) Make complete TRACKING adjustment by repeating steps (1) and (2).

* When properly adjusted, the distortion factor of the output from the unit is reduced to a minimum, provided that the distortion factor of the SG output is about 3%.

FM TRACKING



FM TUNING METER CENTER "0" ADJUSTMENT (PRIMARY)

(1) Turn off quartz switch of the set.
(2) Set FM SG to 98.000 MHz, 1 kHz, 75 kHz dev. output 65 dB.
(3) Set the output of FM SG to OFF (less than −20 dB), and turn T202 until the display of DVTVM connected between TP-4 and TP-5 becomes within ±10 mV.
(4) Set the output of FM SG to ON (65 dB), and attain finetuning with the tuning knob so that the broadcast may be received while the display of DVTVM is within ±10mV.
(5) Turn T307 until the waveform distortion of the oscilloscope connected between TP-12 (hot-left), TP-13 (hot-right) and TP-11 (earth) becomes the minimum. At this time, keep the output of FM SG at MONO position.
(6) Repeat adjustment steps (3) thru (5).
(7) At minimum distortion point, fine-adjust T201 until the waveform distortion of the oscilloscope reaches the minimum again.
(This adjustment requires only a slight rotation of the core of T201.)
(8) Attempt adjustment steps (3) thru (7) once again.

NOTE

If the core is turned too much in step (7), the V-curve may be deviated excessively, so that the practical sensitivity of the set may be lowered. Hence perform fine-adjustment of T201 with care.

FM TUNING METER CENTER "0" ADJUSTMENT (SECONDARY)

(1) Connect frequency counter between TP-16 (hot) and TP-17 (earth).
(2) Set the output of FM SG to ON (65 dB), adjust SG frequency to 98.000 MHz, fine-tune with tuning knob so that the counter output becomes 108.700 MHz.
(3) Turn T202 until the display of DVTVM becomes within ±10 mV.
(4) Detach the counter, and fine-tune with tuning knob so that the broadcast may be received while the display of DVTVM is within ±10 mV.
(5) Turn on quartz switch, and turn T203 until the waveform distortion of the oscilloscope becomes the minimum.

NOTE

- Use IHF filter of high quality characteristics.
- Carry out "0" meter adjustment again when the FM front end or FM IF circuit is repaired or adjusted.

FM MPX ADJUSTMENT

1. Set SVR (R325, R327 — 500K ohms, balanced) in the central position.
2. Feed modulated input into FM SG through stereo modulator.

* Modulation frequency is 1 kHz.

Pilot signal (19 kHz)	6.75 kHz dev. (9% mod.)	75 kHz dev. (100% mod.)
Stereo signal (98 MHz) L + R	68.25 kHz dev. (91% mod.)	

NOTE

The method of taking modulation differs from one instrument to another. Be familiarized with the handling method of the instrument.

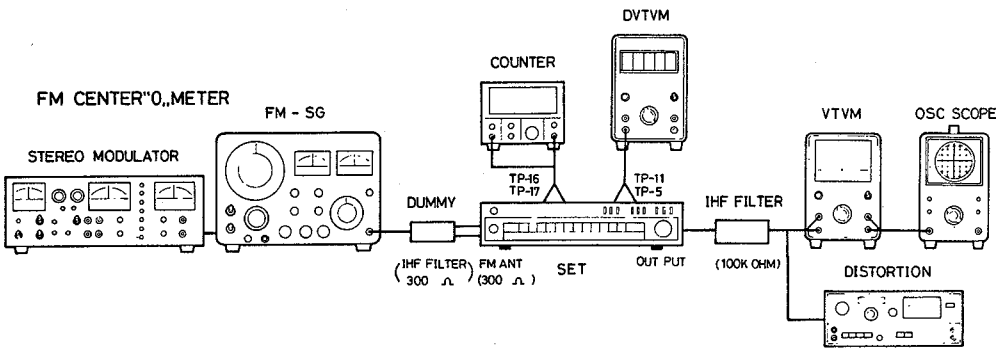
3. Place output signal switch of stereo modulator in MAIN (L + R) position, turn the dial scale of the set to 98 MHz, and tune in to FM SG. *Output of FM SG is 60 dB.

4. Adjustment of 19 kHz (VCO)

(1) Place muting switch of the set in LEVEL 1 position, and selector switch in FM AUTO position.
(2) Connect frequency counter between TP-8 (hot) and TP-11 (earth).
(3) Cut the output of stereo modulator to eliminate modulation, and turn SVR (R345, 10K ohms, balanced) until the counter display becomes within 76,000 kHz ±76Hz.

NOTE

- By turning SVR (semivariable resistor), the level of output (counter input) varies. When the resistance is decreased, if the input level of the counter is too small to produce display in the counter, raise the input sensitivity of the instrument.
- Start VCO adjustment when the state is thermally stabilized in about 10 seconds after lighting of the stereo pilot lamp.
- To eliminate modulation means to turn off PILOT and MAIN & SUB of the output signal switch.
- Use instruments of high input impedance as far as possible.
- Keep the lead wires connected between the set and instruments as short as possible.
If hum may be induced, use a hum cut filter.



5. **Separation adjustment**

(1) Turn on MAIN & SUB signal switch of the stereo modulator, and also turn on PILOT switch, then set the output signal switch to MAIN (state of item 3) side.

(2) Connect VTVM to output terminal of the set, and turn IF band switch to WIDE side. (Change the right and left jack connection of the output terminals, depending on the right and left channel adjustment.)

(3) Set the output signal switch to RIGHT "ON" and LEFT "OFF." Turn SVR 325 (500K ohms, balanced) until the left side leakage current becomes the minimum.

(4) Set the output signal switch to LEFT "ON" and RIGHT "OFF." Turn SVR 325 (500K ohms, balanced) until the right side leakage current becomes the minimum.

(5) When the adjusting position of SVR 325 is the same in both right and left channels, the "wide" adjustment is complete. If it is adjusted at different positions, adjust so that the channel separation of the right and left achieve similar level.

(6) Change IF band switch to NARROR side, and repeat adjustment steps (3) thru (5). In this case, SVR 327 (500K ohms, balanced) is used instead of SVR 325.

NOTE

Separation should be, in both channels, more than 48 dB (wide) and 40 dB (narrow) at 100 Hz.

FM MUTING LEVEL ADJUSTMENT

Set FM-SG as follows: modulation frequency 1 kHz frequency deviation 75 kHz dev. (100% modulation).

- Set the multing switch of the unit to LEVEL 2.

(1) Set FM-SG to 98 MHz and tune the unit to that frequency level.

(2) Apply 40 dB to the 300-ohm terminal antenna.

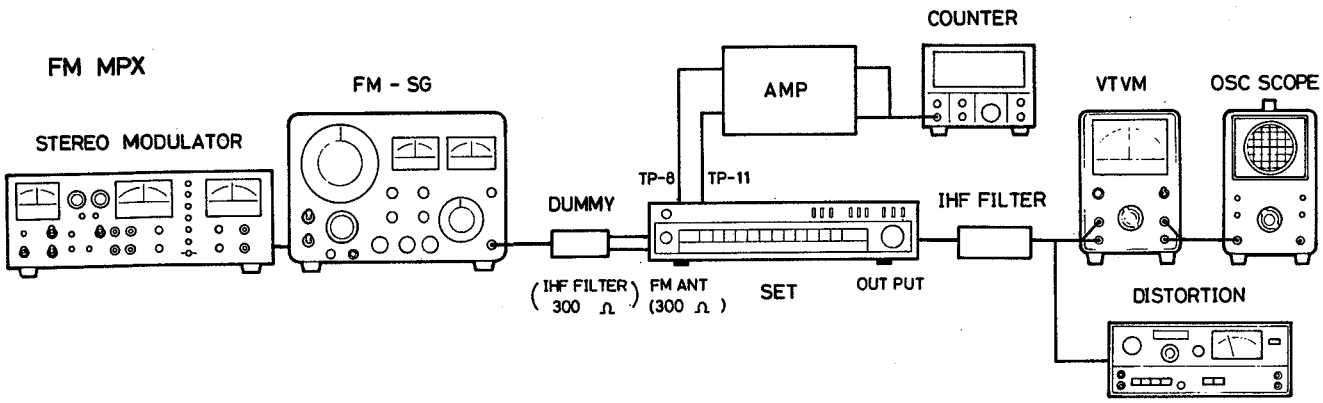
(3) Tune R221 (SVR) and set it at the position where the VTVM needle stops swinging or the waveform on the oscilloscope becomes very small.

- Set the muting switch of the unit to LEVEL 1.

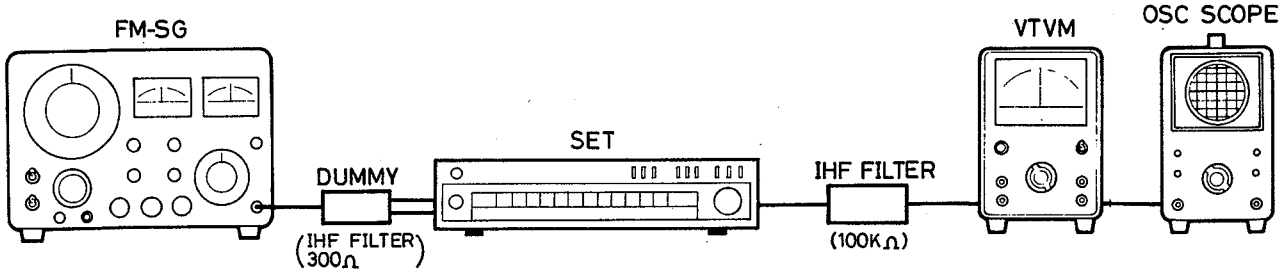
(1) Apply 28 dB to the 300-ohm terminal antenna.

(2) Tune R225 (SVR) and set it at the position where the VTVM needle stops swinging or the waveform on the oscilloscope becomes very small.

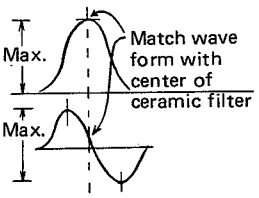
* When the muting function is ON, the waveform decreases in size, and weak signals and noise are cut off.



FM MUTING LEVEL



FM ALIGNMENT

Step	Adjusting Circuit	Connections		SG Frequency	Position of Tuning Dial	Adjust-ment	Meter	Oscilloscope	Etc.
		IN Put	OUT Put						
1	IF-V curve (IF)	Connect Sweep generator to TP-14(H) & TP-15(E)	Connect Oscillo-scope to TP-3(H) & TP-6(E)	10.7MHz (NON modulation)	Near max. capacity of VC at position with unrequired signal.	T201			C220→Open
2	IF-S curve (Ratio Det.)		Connect Oscillo-scope to TP-7(H) & TP-6(E)			T202 T203			
3	Cover-Frequency (O.S.C.)	Connect FM-SG to TP-2(H) & TP-1(E) or ANT. Terminal	Connect VTVM to TP-12(H) (B) TP-13 (H Ⓒ) & TP-11(E) or OUT PUT Terminal	87.4MHz (400Hz 22.5kHz dev. modulation)	Low end of dial Scale	L106	VTVM Max.		
				108.3MHz (400Hz 22.5kHz dev. modulation)	High end of dial Scale	L104	VTVM Max.		
4	Tracking (ANT.)	Connect FM-SG to TP-2(H) & TP-1(E) or ANT. Terminal	Connect VTVM to TP-12(H Ⓒ). TP-13(H Ⓡ) & TP-11(E) or OUT PUT Terminal	90.0MHz (400Hz 22.5kHz dev. modulation)	90.0MHz	L102 L103 L104	VTVM Max.		
				106.0MHz (400Hz 22.5kHz dev. modulation)	106.0MHz	CT-1 CT-2 CT-3	MTVM Max.		
5	Tuning Meter Center 0 (First)	—	Connect DVTVM to TP-4 & TP-5	—	—	T202	DVTVM ±10mV or Less		Quartz SW →OFF FM-SG→ OFF or −20dB
		Connect FM-SG to ANT. Terminal or TP-2(H) & TP-1(E)	Connect Oscillo-scope to TP-12 (H Ⓒ) TP-13 (H Ⓡ) & TP-11(E) or OUT-PUT Terminal	98.0MHz (1kHz 75kHz dev. modulation)	98.0MHz	T201 T203	—	Strain→Min.	FM→SG→ Mono. 65dB Quartz SW →OFF
		Repert Adjustment							
6	Tuning Meter Center "0" (Second)	* Connect FM-SG to ANT. Terminal or TP-2(H) & TP-1(E)	Connect DVTVM to TP4 & TP-5 Connect Counter to TP-16(H) & TP-17(E)	98.0MHz (1kHz 75kHz dev. modulation)	Dial Scale Position where Counter Indicate 108.700 MHz	T202	DVTVM ±10mV or Less		
			Connect Oscillo-scope to TP-12(H Ⓒ) TP-13(H Ⓡ) & TP-11(E)	98.0MHz (1kHz 75kHz dev. modulation)	* Position	T203	—	Strain→Min	Quartz SW →ON
7	IF-Gain	Connect FM-SG to ANT. Terminal or TP-2(H) & TP-1(E)	Connect VTVM to TP-12 (H Ⓒ), TP-13 (H Ⓡ) & TP-11(E) or OUT-PUT Terminal	98.0MHz (1kHz 75kHz modulation)	* position	R209	VTVM	OUT PUT vlue=Min Wide=Narrow	IF BAND SW Wide⇔Narrow
8	VCO	—	Connect Counter to TP-8(H) & TP-6(E)	—	—	R345		Counter 76,000kHz ±76Hz	FM-SG OUT PUT=0 SELECTOR SW→FM auto FM Muting SW→Level 1

Step	Adjusting Circuit	Connections		SG Frequency	Position of Tuning Dial	Adjustment	Meter	Oscilloscope	Etc.
		IN Put	OUT Put						
9	Separation (Wide)	Connect FM-SG to ANT. Terminal or TP-2(H) & TP-1(E)	Connect VTVM to TP-12(H Ⓛ), TP-13(H Ⓡ) & TP-11(E) or OUT PUT Terminal	98.0MHz (1kHz 75kHz modulation)	* position	R329	VTVM OUT PUT vlue Right =Left		IF BAND SW →Wide
	(Narrow)		Connect VTVM to TP-12(H Ⓛ), TP-13(H Ⓡ) & TP-11(E) or OUT PUT Terminal	98.0MHz (1kHz 75kHz modulation)	* position	R327	VTVM OUT PUT vlue Right =Left		IF BAND SW →Narrow
10	Muting (Level 2)		Connect VTVM to TP-12(H Ⓛ), TP-13(H Ⓡ) & TP-11(E) or OUT PUT Terminal	98.0MHz 1kHz 75kHz modulation)	*position	R221	VTVM OUT PUT vlue=0		FM-SG=40dB Muting SW →Level 2
	(Level 1)		Connect VTVM to TP-12(H Ⓛ), TP-13(H Ⓡ) & TP-11(E) or OUT PUT Terminal	98.0MHz 1kHz 75kHz modulation)	*position	R225	VTVM OUT PUT vlue=0		FM-SG=28dB Muting SW →Level 1
11	Signal		—	98.0MHz 1kHz 75kHz modulation)	*position	R228	Point where LED Indicate Signal "5"		FM-SG=65dB
12	REC Level	—	Connect VTVM to TP-12 (H Ⓛ). TP-13 (H Ⓡ) & TP-11(E) or OUT PUT Terminal	—	—	R350	OUT PUT vlue →50% of FM-SG FM-SG input (1kHz 75kHz dev. — modulation)		REC Level SW →ON

Note:

1. Match IF with the resonance point of the ceramic filter.
2. After IF V-curve and S-curve adjustments, short-circuit C220 by soldering to form the original circuit.
3. Turn R209 clockwise to set it in a position to decrease output. Confirm wide/narrow level by lighting sensitivity of a signal indicator.
4. Adjust in order of Step Nos. given.
5. Use an IHF dummy of 300Ω balanced resistor for FM connecting antenna.
6. VTVM refer to a vacuum tube voltmeter; DVTVM, digital vacuum tube voltmeter.
7. Perform a high-precision adjustment for cover adjustment.
8. Add to AC 115/220V 50Hz.
9. Use a screwdriver with plastic grip for all adjustment.
10. Selector switch to "MW" ("AM").
11. Connect Sweep generator, FM-SG, VTVM, DVTVM and Oscilloscope, Countor.

AM ALIGNMENT

Step	Adjusting Circuit	Connections		SG Frequency	Position of Tuning Dial	Adjustment	Meter	Oscilloscope	Etc.
		IN Put	OUT Put						
1	IF	Connect Sweep generator to Test Loop ANT.	Connect Oscillo-scope to TP-12(H) & TP-11(E)	455kHz (400Hz, 30% modulation)	Low end of Dial Scale. At position of unrequired signal	T204 T205		Max.	Match wave form with center of ceramic filter.
2	Cover frequency	Connect AM-SG to Test Loop ANT.	Connect VTVM to TP-12(H) & TP-11(E)	508kHz (400Hz,30% modulation)	Low end of dial scale	L108	VTVM Max.		
				1700kHz (400Hz,30% modulation)	High end of Dial Scale	CT-6	VTVM Max.		
3	Tracking (ANT.)	Connect AM-SG to Test Loop ANT.	Connect VTVM to TP-12(H) & TP-11(E)	600kHz (400Hz,30% modulation)	600kHz on Dial Scale	L107	VTVM Max.		
				1400kHz (400Hz,30% modulation)	1400kHz on Dial Scale	CT-5	VTVM Max.		
4	Signal	Connect AM-SG to Test Loop ANT.	—	1000kHz (400Hz,30% modulation)	1000kHz on Dial Scale	R234	Point where LED indi-cate Signal "5"		AM-SG=126dB

PREPARE:

1. Add to AC 115/220V 50Hz.
2. Use a screwdriver with plastic grip for all adjustment.
3. Selecter switch to "MW".
4. Connect sweep generator, AM-SG VTVM and oscilloscope.
5. Output load, 100KΩ, IHF filter attached (output terminal)
6. Cover frequency adjustment should be a high-precision adjustment.
7. Make SG output a high output because IF disturbance factor of this set is very good at the time of IF adjustment.
8. For IF adjustment, match IF with resonance frequency of the ceramic filter.

Quartz ALIGNMENT

Step	Adjusting Circuit	Connections		SG Frequency	Position of Tuning Dial	Adjustment	Meter	Etc.
		IN Put	OUT Put					
1	VCO	—	Connect Counter to TP-1 (H) & TP-2(E)	—	—	CT-401	Counter 400,000kHz ±4Hz	
2	BIAS	—	Connect DVTVM to TP-3 & TP-4	—		R470	DVTVM ±10mV or Less	

Digital Counter (Frequency Display AUGNMENT)

Step	Adjusting Circuit	Connections		SG Frequency	Position of Tuning Dial	Adjustment	Meter	Etc.
		IN Put	OUT Put					
1	FM Frequency Fine Adjustment	Connect FM-SG to FM-ANT (300M) Terminal	Connect VTVM to OUT-PUT Terminal	98,000MHz (1kHz, 75kHz dev. modulation)	98,000MHz	R023	Frequency Display flashing stop	IF OFF SET → FM
2	AM Frequency Fine Adjustment	Connect AM-SG to AM-ANT Terminal	Connect OSC-scope to OUT-PUT Terminal	1000kHz (4000Hz,30% modulation)	1000kHz	R040	Frequency Display flashing stop	IF OFF SET → AM

QUARTZ BLOCK ADJUSTMENTS

1. VCO adjustment

(1) Connect counter between TP-1 (hot) and TP-2 (earth).

(2) Adjust CT401 until the counter display becomes 400,000 kHz ± 4 Hz.

NOTE

Use counter of high input impedance.

2. Bias adjustment

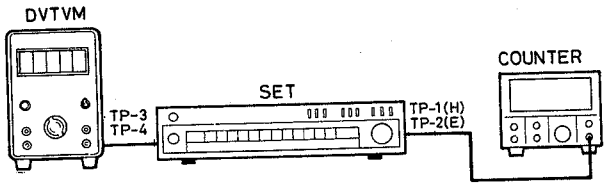
(1) Connect DVTVM between TP-3 and TP-4.

(2) Adjust R470 (SVR) until the DVTVM indicates less than ± 10 mV.

NOTE

- Use DVTVM or DC voltmeter of which resolution is less than 1 mV. Also use one of high input impedance.
- With quartz switch turned off, adjust at the position where local oscillation frequency is deviated several kHz from 50 kHz or 100 kHz position.

Quartz Bias

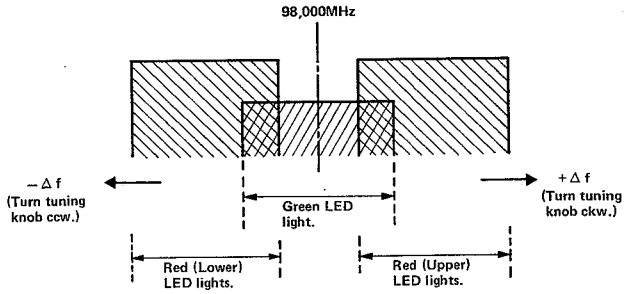


3. Tuning meter center "0" balance adjustment

The lighting width of LED for center (green) should be at the upper side or lower side of the frequency. If unbalanced, correct by means of R472 (SVR).

4. Lighting test of three tuning LEDs

Apply signal of 98.000 MHz, output 60 to 80 dB from FM SG (MONO) into ANT input fo the tuner, and turn dial knob to receive the signal. At this time, make sure the three LEDs light up as illustrated below (quartz switch: OFF).

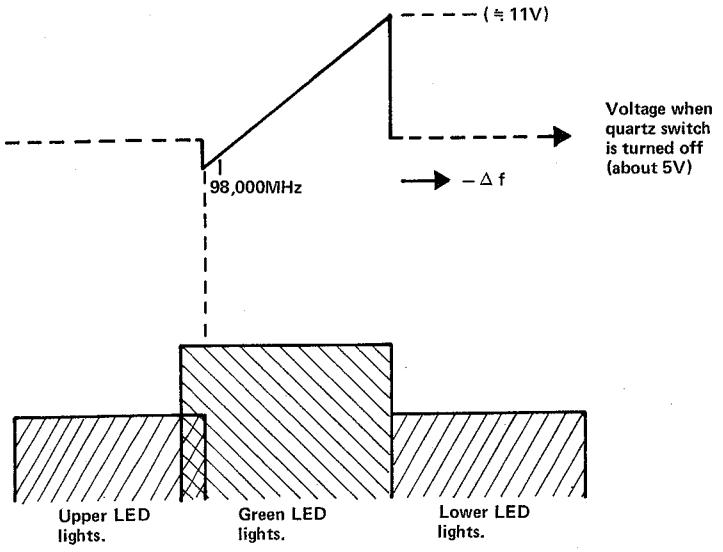


5.

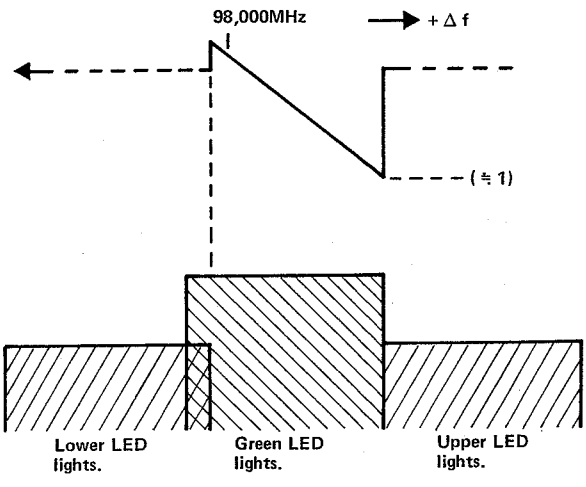
(1) In lighting test of (4), stop at the position where only the green LED lights, and turn on quartz switch, then make sure the lock indicator (red LED) lights up.

(2) With quartz switch turned on, perform tuning operation, and make sure the voltage between TP-4 and the earth becomes as shown below.

6. Make sure tuning LED does not light while the signal indicator (LED) is being put out.



Turning knob ccw rotation.



Turning knob ckw rotation

DEGITAL COUNTER BLOCK

1. FM frequency fine adjustment

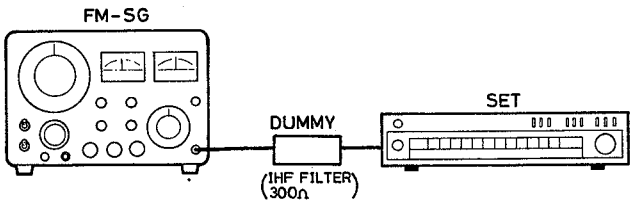
(1) Set FM SG to 98.000 MHz, 1 kHz, 75 kHz dev. (100% modulation), and feed this signal into FM ANT terminal (300-ohm) of the set.

(2) Tune in by tuning the tuning knob, and turn on quartz switch (locked).

(3) Tip IF OFFSET to FM side. That is, short-circuit by connecting the tip of R023 connected to FM/AM terminal (pin No. 12) of IC 002 to the earth. Then the second place from the bottom (digit 2) flickers.

(4) Turn SVR R039 (10K ohms, balanced) and adjust until the display becomes 98.000 and digit 2 stops flickering.

FM FREQUENCY FINE



2. AM frequency fine adjustment

(1) Produce signals of 1000 kHz with AM SG and 4,000 Hz, 30% modulation at the external modulation terminal, and apply the signals into AM ANT terminal.

(2) Tune in by turning the tuning knob, and stop where the output reaches the lowest level. (See waveform.)

(3) Tip IF OFFSET to AM side. That is, short-circuit by connecting the tip of R023 connected to FM/AM terminal (pin No. 12) of IC 002 to V_{DD} (+9.4 V). Then the second place from the bottom (digit 2) flickers.

(4) Turn SVR R040 (10K ohms, balanced) and adjust until the display becomes 1000 and digit 2 stops flickering.

QUARTZ SAMPLING LOCK

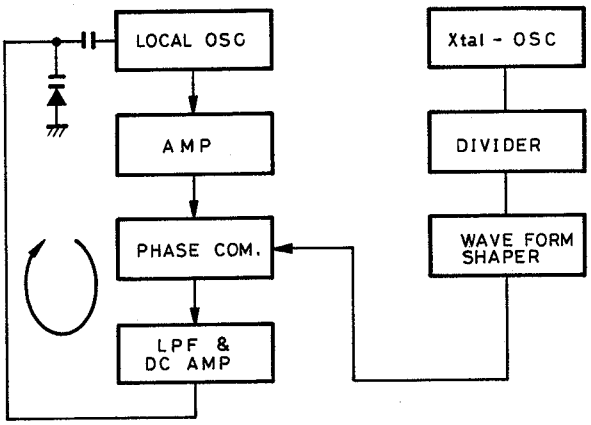
1. Principle

The quartz sampling lock (QSL) is designed to compare the phase of FM local oscillation frequency with the reference frequency generated by crystal oscillator, convert the fluctuations of local oscillation into DC voltage and apply it to a variable capacity diode (varicap diode) in order to control the local oscillation. The crystal fundamental oscillation frequency is 6.4 MHz, which is divided to 1/128, so that the local oscillation can be locked at 50 kHz intervals using the 50 kHz frequency as the reference frequency.

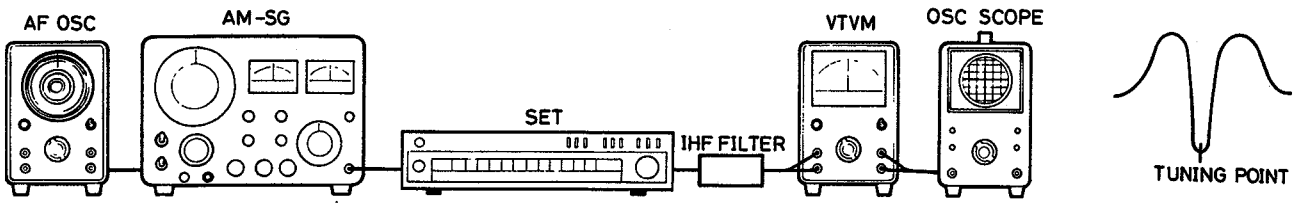
2. Circuit description

Part of local oscillation is taken out from FM local oscillation through buffer Q106, and is amplified in Q401.

On the other hand, fundamental oscillation (6.4 MHz) and frequency dividing are performed by Q411 (a frequency divider built in oscillation circuit), and a square wave output of 50 kHz is obtained. Next, the waveform is shaped by Q410 (TTL NAND gate) (see Fig. 1), and high speed pulse of 50 kHz is obtained in the output. By switching Q403 with high speed pulse, Q402 operates when Q403 is ON. Therefore, since the previous RF AMP output is impressed to the base of Q402, the phase of the local oscillation when Q402 is ON can be detected. C4648P is a charge pump, and holds the output after phase detection until a next pulse (Fig. 3).



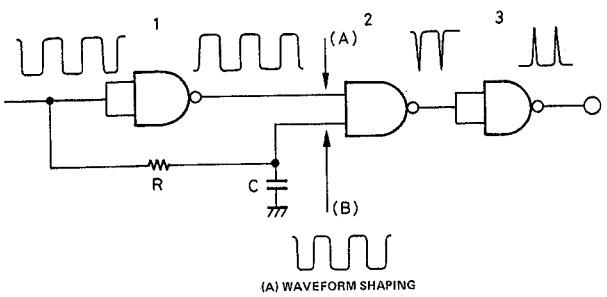
AM FREQUENCY FINE



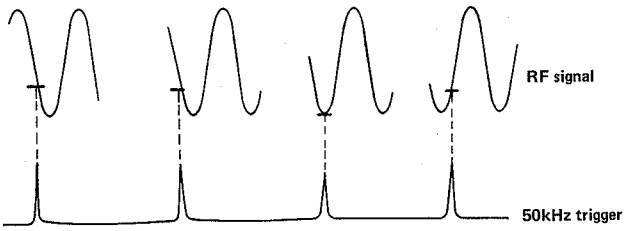
Q404 is a buffer, and Q405 is a high input impedance circuit, which is also a switching circuit. When the local oscillation frequency approaches within ± several kHz of 50 kHz, each circuit functions, and Q405 is turned on.
At the same time, the closed loop shown in Fig. 1 is formed, and the local oscillation frequency is locked.
Q406 is a device comprising two operational amplifiers: one forming active LPF and DC AMP and the other forming HPF AMP.
Q406 (1) terminal receives HPF output, which is rectified and smoothed by D412, 413 to drive Q407. When the beat frequency of phase comparator output nears zero, the base voltage of Q407 lowers to cut it off. As a result, Q404 (14) becomes high level, and (15) low level. On the other hand, S-curve output is taken from the tuner section,which is amplified by Q408 to obtain center signal and side signal. Terminal (7) receives the center signal output, and becomes low level within ± 20 kHz of the center frequency (Fig. 4). In consequence, Q414 (9) becomes L and (10) becomes H. Parallel to this, by switching on and off Q416 with the muting output obtained from SIGNAL 1, Q414 (14), (7), (3) and Q417 are controlled.

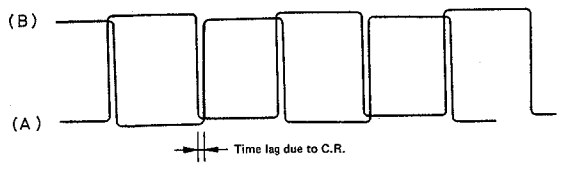
Meanwhile, the side signal, by using the other operational amplifier of Q408, obtains a signal as shown in Fig. 5, and controls the side LED. The relation between signals and frequencies is shown in Fig. 6.

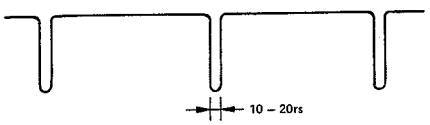
Also, when AM signal is applied, the cathode of D404 is pulled to L side, and the oscillation of Q411 is stopped.
Q409 and Q413 are the circuits to maintain within the broadcast frequency even if the local oscillation frequency is deviated due to temperature changes when the power source is turned on again a short while after cutting off the power when a broadcast had been being received. These circuits depend on charging of C426. When charging of C426 is completed, the operation is designed to be stopped automatically. Q418 is to discharge C426.



(A) WAVEFORM SHAPING

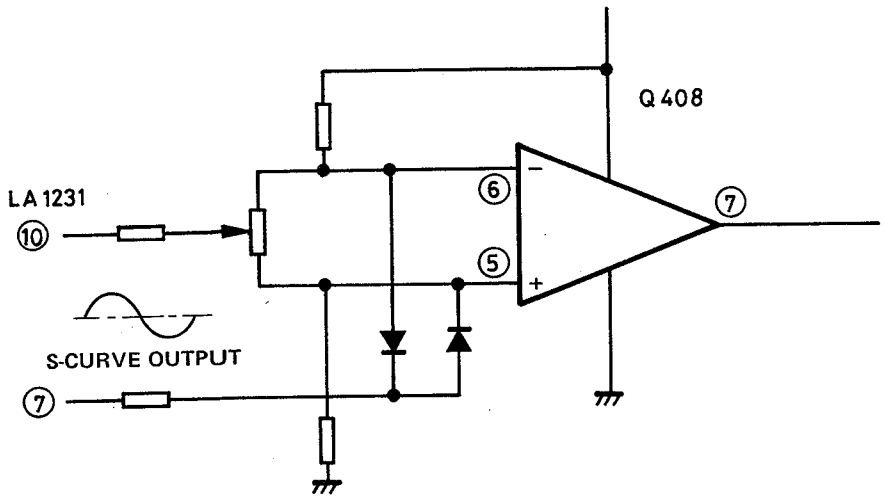




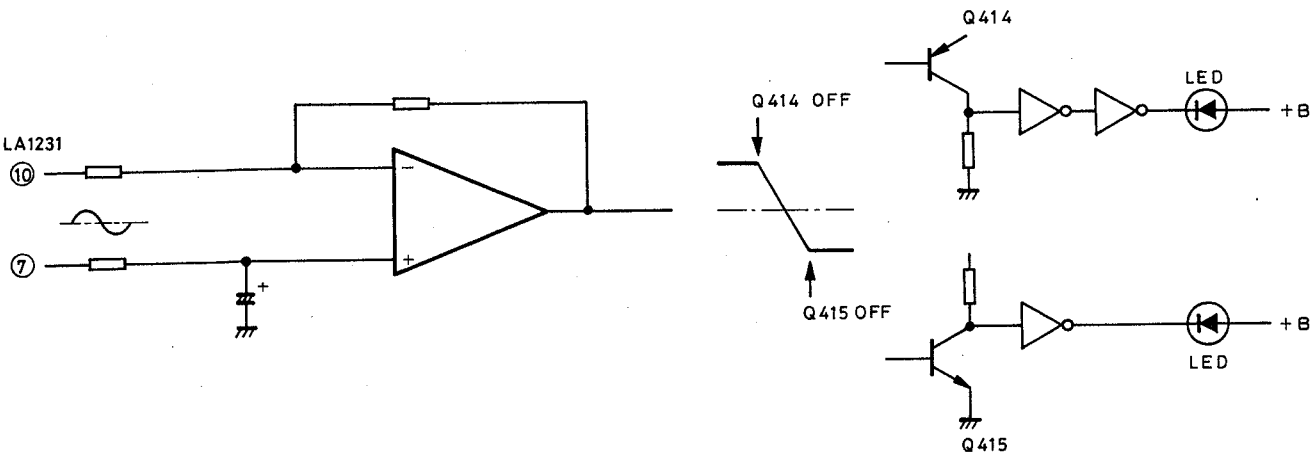


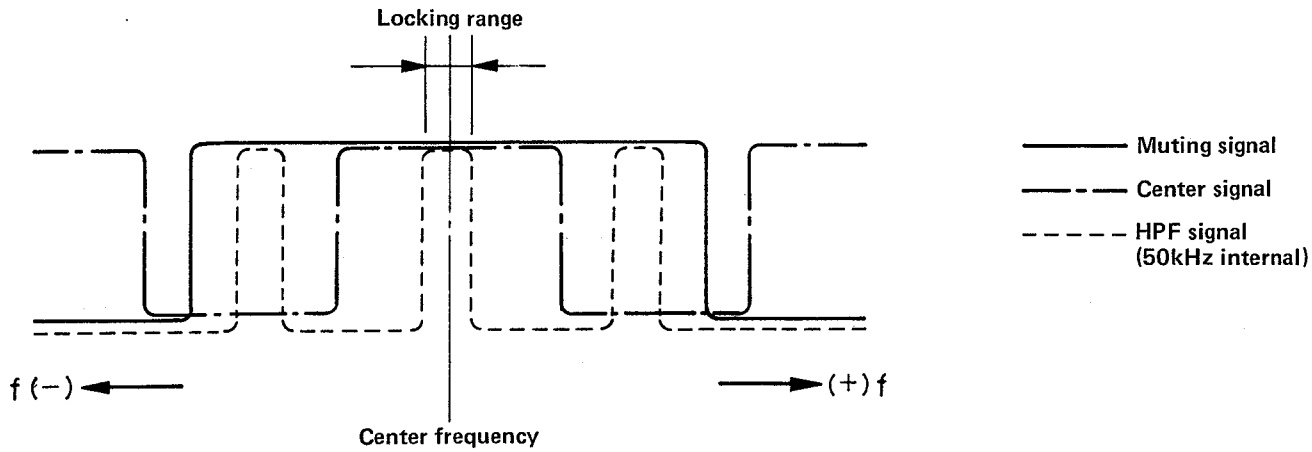
(B) PERFORMANCE OF GATE 2

CONTINUOUS WAVEFORM (BEAT)
(Beat corresponding to frequency deviation of local oscillation and reference frequency is generated.)


Q408
LA1231
⑩
⑥
⑤
⑦
S-CURVE OUTPUT
⑦

CENTER SIGNAL


LA1231
⑩
⑦
Q414 OFF
Q415 OFF
Q414
LED
+B
LED
+B
Q415


Locking range
f (−)
(+) f
Center frequency
Muting signal
Center signal
HPF signal
(50kHz internal)

DESCRIPTION OF DISPLAY UNIT

This set provides dial display, signal level display, and FM tuning display. The signal display and FM tuning display are shown by LEDs, while the dial display is made by fluorescent display tubes.

The fluorescent display tube is a vacuum triode consisting of the plate, grid, and filament. In structure, spreading the plate is fluorescent material, the plate is designed to emit light only when the plate current flows. Therefore, in order to illuminate the plate, it is necessary to control the voltage applied to the plate and grid. Positive voltage is always applied to the grid to accelerate the thermions generated in the filament, and only when the positive voltage is impressed to the plate, the fluorescent material is illuminated (lighting of the display tube). When the plate voltage is 0 volt, plate current does not flow because the state is in cut-off mode, so that the fluorescent material is not illuminated.

Dial display

The dial display is provided by 8-segment numerals, which are given in maximum 5 digits (the highest digit is "1" alone). The lowest digit is either 0 or 5. When the highest digit is not necessary, the place is kept blank, not shown by "0" (this is called the zero suppression).

The frequency can be displayed both in FM and MW (AM) bands. In the case of FM band, the "FM" mark, MHz unit mark, and decimal point are illuminated at the 3rd place from the right (lowest digit) side. In the case of MW (AM) band, the "MW" (AM) mark and kHz unit mark are displayed, but the decimal point does not light up. The display forms of both bands are shown below in Table 1.

For digital display of the dial indication, the frequency of the local oscillator is used as the signal source, and the intermediate frequency is added to or subtracted from this frequency (added in this model), and the reception frequency is calculated, and counted and displayed by the counter. To illuminate this display, first turn on power switch. Then, 2.4 V AC is applied to filament terminal F. Next, set the band selector to FM or MW (AM) position, which causes Q005, Q004 to be controlled, so that the voltage (+9.4 V) of Q003 is applied to the grid terminal G. At the same time, a voltage is also applied to LED for pointer (D001) to light it up. Also by setting the band selector to FM or MW (AM), Q706, Q705 are controlled at plate terminals 1S1, 2S1, Dp3, or 1S2, 2S3, 2S4, 2S2 and +12.5 V voltage is impressed, so that FM, MHz, and decimal point, or MW (AM) and kHz are illuminated.

Voltage is applied to the plate terminals of each segment in the following sequence, and the numerals are illuminated.

The local oscillation frequency of FM or AM is amplified by Q001 or Q002 by way of the buffer of Q105 or Q107. After only the FM frequency is amplified, it is divided to 1/100 by IC001. Signals of FM or MW (AM) are applied to terminal "Fin" of IC002. Meanwhile, the frequency of FM and MW (AM) is changed over by pin 6 of IC001, which is an 8-pin DIP composed of TTL IC, containing ECL in the inside.

IC002 is a LSI for digital 5-digit frequency display with clock function (the clock block is not used in this model), composed of C-MOS. It is a 42-pin DIP in structure. And its output (each segment) can be used to drive the fluorescent display tube directly. The display circuit operates in static motion, and the output terminal thereof is of P channel open drain type.

The frequency fed in "Fin" terminal is amplified and enters the frequency counter by way of the control unit to be counted. At this time, according to the band selection, the intermediate frequency is added to the frequency counter. The content of the counter after addition is latched (synchronized in time) together with the timing pulse, and is fed into the multiplexer unit. In the multiplexer unit, according to the content of the counter, the display content is decoded. Te output of the multiplexer is the same as the segment output, but in order to make it into the voltage for fluorescent display tube, this voltage is supplied into the segment driver, and the output thereof is connected to each digit and segment of the corresponding fluorescent display tubes. Since each segment is plate terminal, the voltage is impressed according to the counter content, and the impressed segment will be illuminated.

The function of each terminal is described below.

- OSC-IN (pin No. 20), OSC-OUT (pin No. 19). These terminals are for crystal oscillation; oscillating the reference frequency (4,000,000 Hz), they are used for timing control.
- FM/AM (pin No. 12). This terminal can determine the display form in each band, and is controlled by Q004, Q005.
  L level: MA (AM) displayed in 5 digits.
  H level: FM displayed in 4 digits.

Table 1. Display Forms of FM/MW (AM) Bands

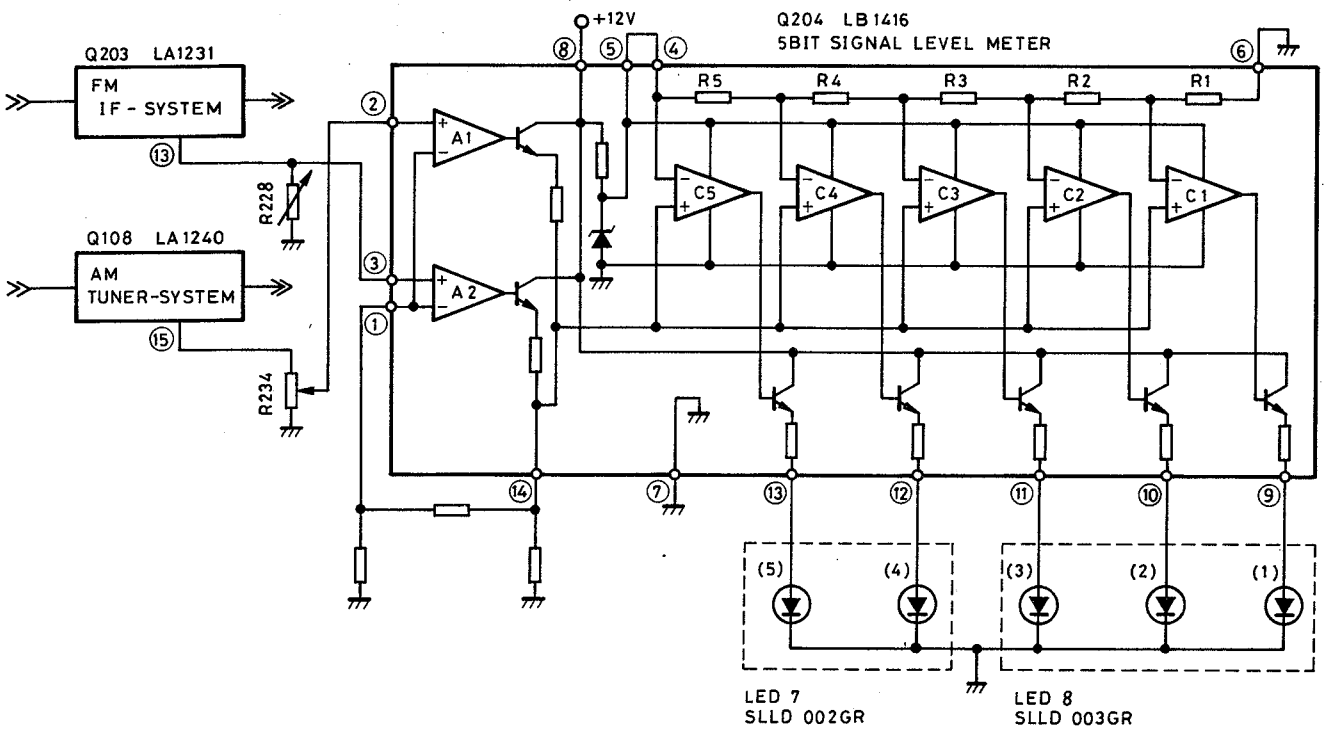
Band	Frequency range	Unit	Max. digits displayed	Decimal point position	Min. frequency unit displayed	Remarks
FM	87.50 ~ 108.00	Mhz	5 digits	Before 2nd place from bottom	50 kHz	• Highest place is displayed only by 1, otherwise kept blank. Lowest place is displayed by 0.
MW (AM)	510 ~ 1605	kHz	4 digits	None	1 kHz	• Highest place is displayed only by 1, otherwise kept blank. Lowest place is not illuminated.

- IF-AM (pin No. 8). It can determine the setting of the intermediate frequency of FM, and is controlled by Q004, Q005, and Q007.
  H level: +10.7 MHz.
- IF-AM1 (pin No. 11), IF-AM2 (pin No. 9). These terminals together with FM/AM terminal, can determine the intermediate frequency of MW (AM), and are controlled by Q004, Q005, and Q007.
  In all three terminals, L level: +445 MHz.
- FM-Fine (pin No. 13). This terminal is an input for fine adjustment to correct the deviation of intermediate frequency of FM, and feeds divided voltage of semivariable resistor R039.
- AM-Fine (pin No. 14) This terminal is an input for fine adjustment to correct the deviation of intermediate frequency of MW (AM), and feeds divided voltage of semivariable resistor R040.
- Vref (pin No. 10). This terminal is at the reference voltage, and is controlled by Q004, Q005, and Q007.
- TRC/CLK (pin No. 15), SET (pin No. 16), DEMAND (pin No. 17), 12H/24H (pin No. 18). These terminals are for controlling the clock, which are not, however, used in this model, and, hence, set at H level.
- 0 (pin No. 5). This terminal is to light the lowest digit of display in the case of FM band. It is held at H level. When voltage is applied to segments a, c, d, f, and g of the lowest digit and to the plate terminal, the numeral "5" will be illuminated (when pin No. 4 is 0 V).
- 5 (pin No. 4). This terminal is intended to change over the display of the lowest digit in FM band between 0 and 5.
  L level: State of 0 (pin No. 5) held — "5" lighted.
  H level: Q008 turned ON, voltage not impressed to segment g, instead impressed to plate terminals of segment b, and e — "0" lighted.

Signal level display

The display of signal level meter (electric field intensity display) is formed in the upper part of the dial case with two LEDs in five stages (5 segments).

The principle of signal level meter display is to pick up IF signal of FM or MW (AM), and to present a display through the segment driver after A-D conversion in 5 stages. The FM IF signal is picked up from the output of signal meter drive (pin No. 13) of Q203 (FM IF system). The MW (AM) IF signal is picked up from pin No. 15 of Q108 (AM tuner system). The signal thus taken out is fed into IN_2^+ (pin No. 3, IN_1^+ (pin No. 2) of Q204 (5-bit level meter) through signal adjusting semivariable resistors R228, R234. The input signal is amplified by operational amplifiers A1, A2 in Q204, and is compared in operational amplifiers C1 through C5, to be divided into signals in 5 stages. The reference voltage to compare with is divided by R1 through R5 to be generated. When an input higher than the comparative reference voltage is fed, the output becomes H level, thereby lighting up the LED.



FM tuning display

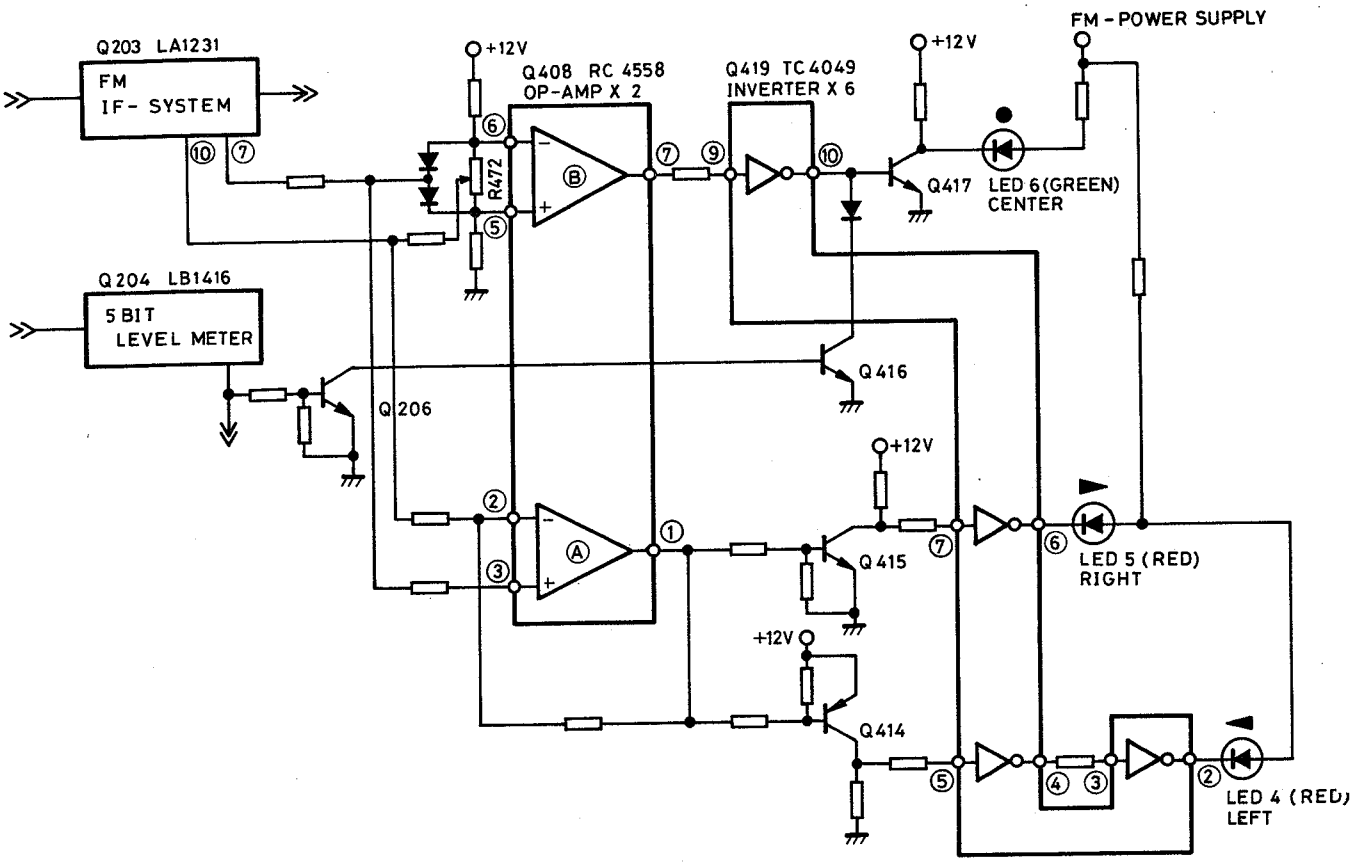
The FM tuning display is given in the upper part of the dial scale with three LEDs in the form of (▶·◀).

The principle of FM tuning display is to pick up IF S-curve of FM, compare the central voltage in operational amplifier to detect the center output, and light up the LED for center. Also, the positive potential and negative potential are detected in the operational amplifier to check whether the tuning is deviated to the right or left with respect to the dial scale, so that the corresponding LED is illuminated.

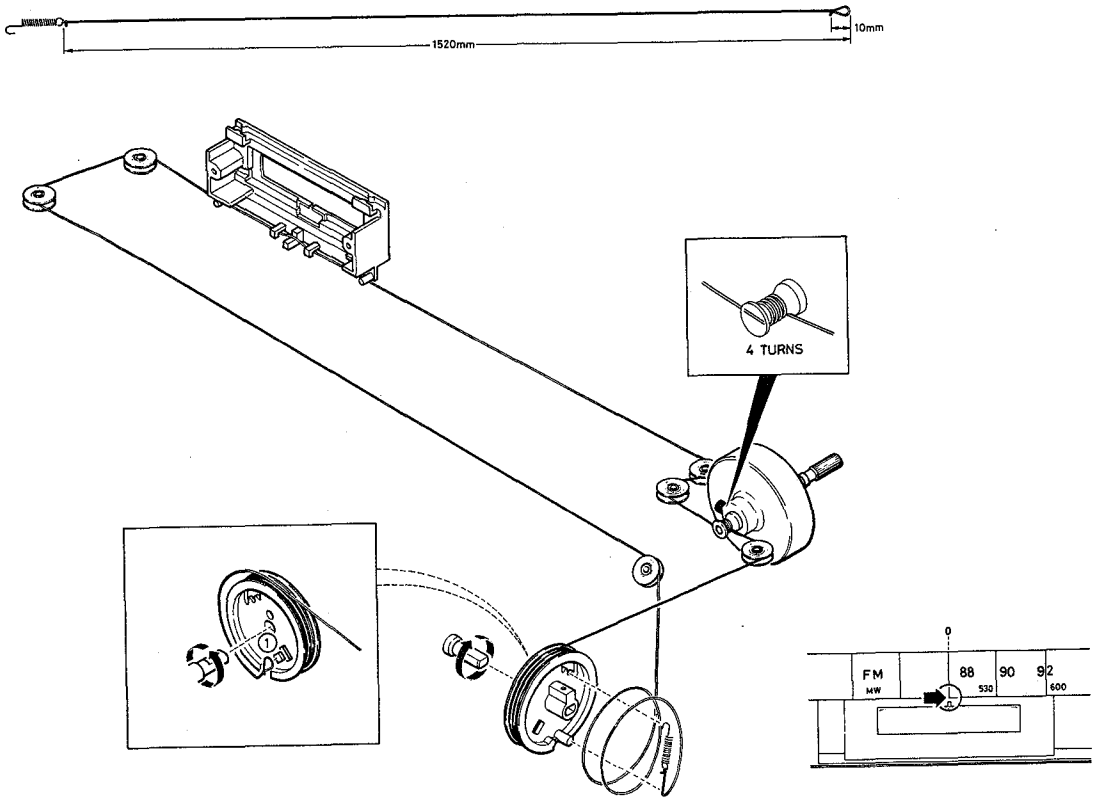
The S-curve signal is taken out from pin No. 7 and pin No. 10 of Q203, and is fed into Q408 (operational amplifier). Q408 comprises two operational amplifiers. In operational amplifier (B), the comparative voltage is taken small to detect the center, and the voltage is shaped and inverted in Q419 (inverter), and the LED [·] for center (LED 6, green) is driven by Q417 to light it up. In operational amplifier (A), on the other hand, the positive potential and negative potential of the input signal voltage are detected: if the potential is positive, Q415 is turned on, and the voltage is shaped and inverted by Q419, so that the right side deviation mark LED [▶] (LED 5, red) is illuminated, and if the potential is negative, Q414 is turned on, and the voltage is shaped and inverted by Q419 twice, so that the left side deviation mark LED [◀] (LED 4, red) is illuminated. Meanwhile, Q417 is controlled by Q416, which is intended to prevent the center LED from lighting up when the signal intensity is below LEVEL 1.

REC. LEVEL Switch

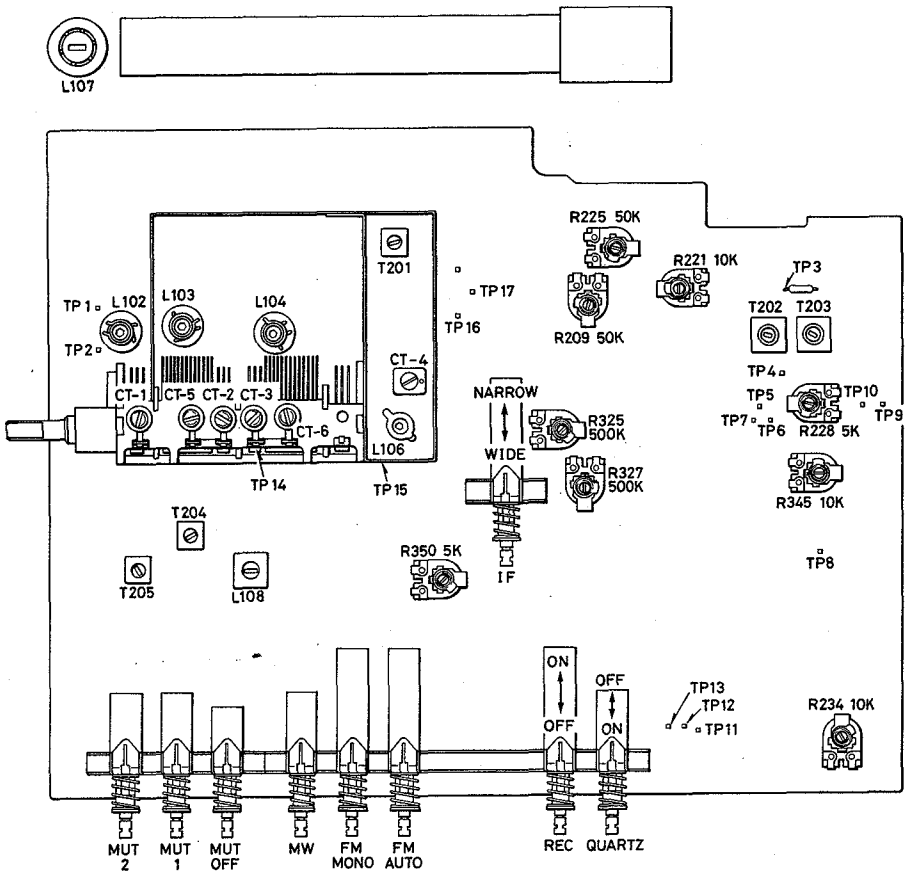
- As this switch is turned ON, voice of FM broadcasting is cut off, and reference signal in time of recording is fed to the amplifier or tape deck from the output terminals.
- Reference signal is a sine wave of about 400 Hz having the level corresponding to 50% modulation (the maximum value of voice signal) or FM wave produced by the oscillator (Q310 jointly used with AF-AMP.) built into this set. Consequently, if recording level is set to agree with this reference signal, good recording become posseble easily.
- Oscillation circuit is used jointly with the Q310 (MJM-4558) of the AF-AMP.

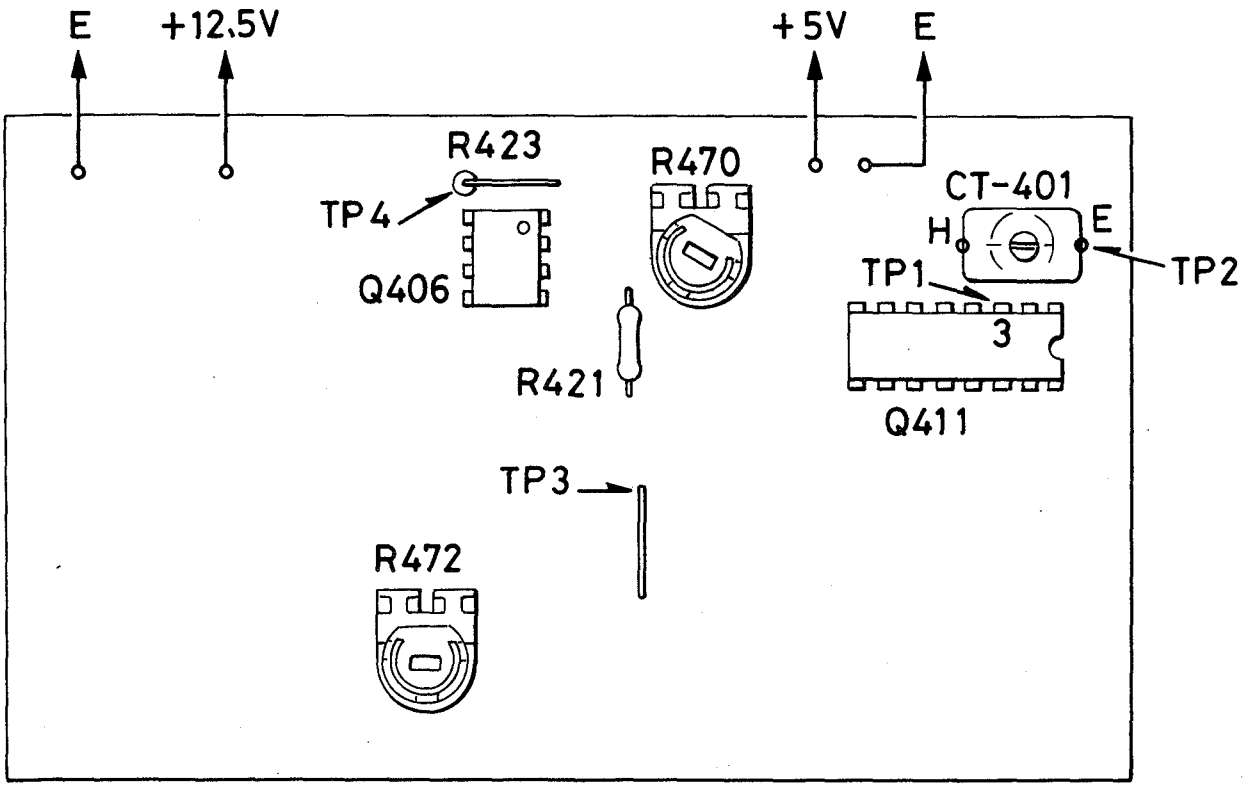


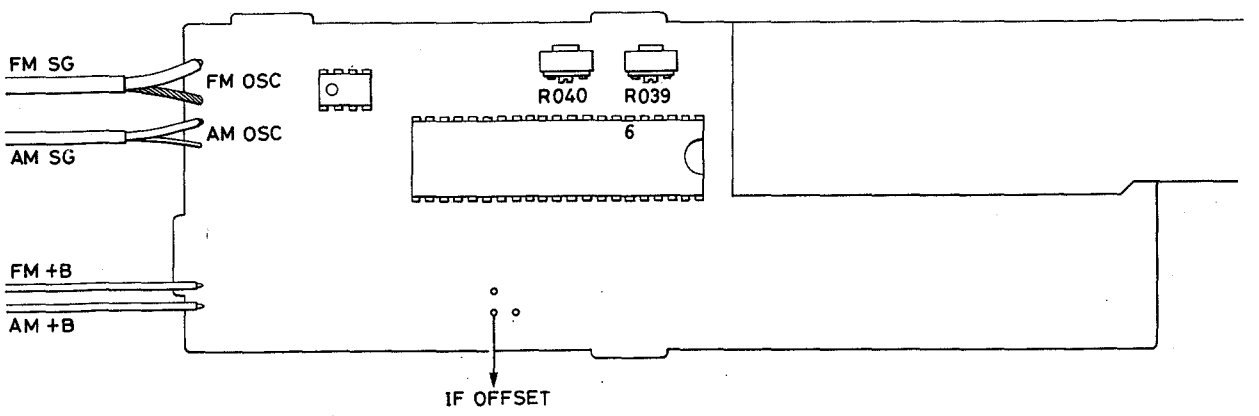
DIAL CORD STRINGING



PARTS LOCATION

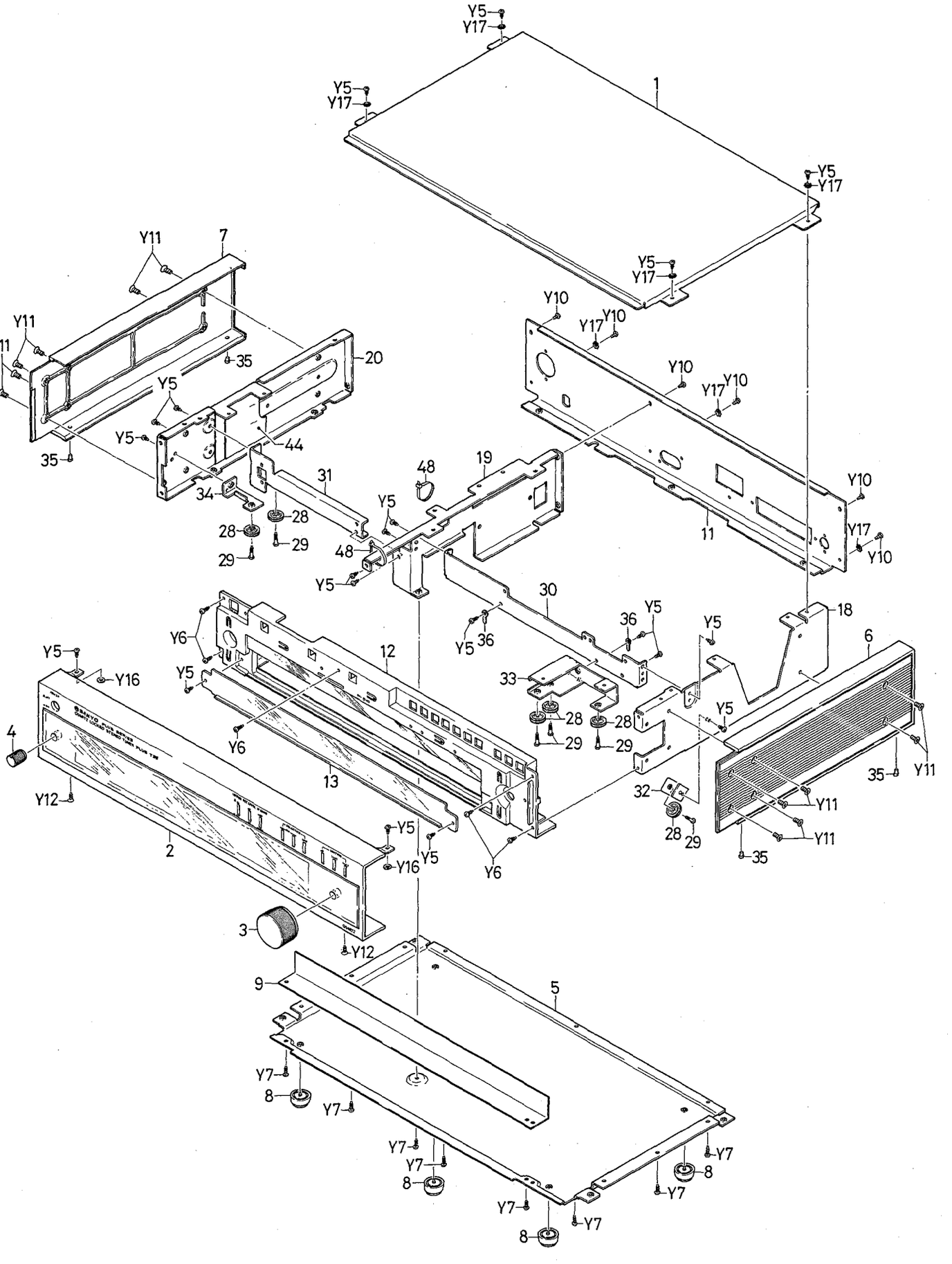



E
+12.5V
+5V
E
R423
TP4
Q406
R470
CT-401
H
E
TP2
TP1
3
Q411
R421
TP3
R472


FM SG
FM OSC
AM OSC
AM SG
R040
R039
6
FM +B
AM +B
IF OFFSET

FM
MW
188.8.8
MHz
kHz
a
b
c
d
e
f
g

CABINET EXPLODED VIEW



PARTS LIST

Key No.	Part No.	Description	Q'ty
PACKING			
	141-6-133T-03800	Individual Carton (Silver)	1
	141-6-133T-03801	Individual Carton (Black)	1
	141-6-144T-57200	Foam Plastic Case	2
	141-6-317T-16300	Pad, Antenna	1
	141-6-317T-20100	Pad, Set Bottom	1
	141-6-317T-20200	Pad, Set back	1
	141-2-246T-37100	Sheet 420x260, Set	2
	141-6-231T-45600	Inner Polye Cover, Set	1
	141-6-231T-10250	Inner Polye Cover, AC Cord	1
	141-6-231T-25350	Inner Polye Cover, Inst. B.	1
ACCESSORY			
	141-6-410T-31900	Instruction Manual	1
	141-6-415T-23500	Notice, NORWAY	1
	4-245T-00171	Antenna	1
	4-243T-13374	Lead Cord, RCA-RCA	1
CABINET			
1	141-2-111T-40900	Cabinet (Silver)	1
	141-2-111T-40930	Cabinet (Black)	1
2	141-0-122T-30200	Front Panel Ass'y (Silver)	1
	141-0-122T-30230	Front Panel Ass'y (Black)	1
3	141-0-163T-62401	Rotary Knob Ass'y, Tuning (Silver)	1
	141-0-163T-62431	Rotary Knob Ass'y (Black)	1
4	141-0-163T-62501	Rotary Knob Ass'y, Volume (Silver)	1
	141-0-163T-62531	Rotary Knob Ass'y (Black)	1
5	141-2-125T-18500	Bottom Lid	1
6	141-0-123T-04000	Side Panel Ass'y (Silver)	1
	141-0-123T-04030	Side Panel Ass'y (Black)	1
7	141-0-123T-04100	Side Panel Ass'y (Silver)	1
	141-0-123T-04130	Side Panel Ass'y (Black)	1
8	141-0-174T-05101	Stand Ass'y	4
9	141-2-135T-64500	Cover	1
CHASSIS			
11	141-2-126T-30700	Back Lid (Silver)	1
	141-2-126T-30730	Back Lid (Black)	1
12	141-0-214T-04400	Bracket Ass'y, Frame	1
13	141-2-151T-16600	Decorative Panel	1
14	141-2-161T-65500	Push Button (Silver)	9
	141-2-161T-65530	Push Button (Black)	9
15	141-0-253T-18800	Joint Ass'y Power Switch (Silver)	1
	141-0-253T-18830	Joint Ass'y (Black)	1
16	141-2-253T-18600	Joint	8
17	141-2-253T-18700	Joint, IF Switch	1
18	141-2-315T-19900	Reinforcement, Right	1
19	141-2-315T-20000	Reinforcement, Center	1
20	141-2-315T-20100	Reinforcement, Left	1
21	141-2-210T-13600	Bracket	1
22	141-2-310T-26000	Bracket	1
23	141-0-566T-09200	Tuning Shaft Ass'y	1
24	141-2-538T-10700	Drum	1
25	141-2-855T-38700	Spring Coil	1
26	141-2-340T-00200	Rope	1
27	141-2-411T-08100	Plate Nut	1
28	141-2-661T-71300	Pulley	6
29	141-2-421T-20900	Special Screw, Pulley	6
30	141-2-310T-27800	Bracket, Switch	1
31	141-2-310T-29300	Bracket, Power Switch	1
32	141-2-310T-30400	Bracket	1
33	141-2-310T-29200	Bracket	1
34	141-2-310T-30500	Bracket	1
35	141-2-174T-08502	Stand	4
36	123-2-472R-00401	Lug	6
37	141-2-322T-50500	Shield Plate	1
38	141-2-322T-50600	Shield Plate	1
39	141-2-322T-51500	Shield Plate	1
40	141-2-322T-51600	Shield Plate	1
41	141-2-411T-04700	Plate Nut, Power Trans	2
42	141-2-464T-14400	Fixer	1
43	141-2-246T-62400	Sheet	1
44	141-2-246T-62100	Sheet	1
45	141-2-447T-18601	Cushion 10x10x8	1
46	141-2-472T-01201	Lug	1
47	141-2-464T-24100	Fixer	2
48	141-2-464T-20600	Fixer	8
49	141-2-464T-10200	Fixer	2

Key No.	Part No.	Description	Q'ty
HARD WARE			
y1		Pan Hd. Screw 3x6mm	6
y2		Pan Hd. Screw 3x8mm	3
y3		Pan Hd. Forming Screw 3x4mm	2
y4		Pan Hd. Tapping Screw 3x4mm	1
y5		Pan Hd. Tapping Screw 3x6mm	23
y6		Pan Hd. Tapping Screw 3x8mm	17
y7		Pan Hd. Tapping Screw 3x10mm	8
y8		Pan Hd. Tapping Screw W/washer 3x6mm	11
y9		Pan Hd. Tapping W/washer 3x8mm	3
y10		Binding Hd. Tapping Screw 3x6mm	6
y11		Flat Hd. Screw 4x8mm	12
y12		Flat Hd. Tapping Screw 3x10mm	2
y13		Pan Hd. Screw W/spring Washer 3x8mm	2
y14		Hexagon Nut 3mm	3
y15		Hexagon Nut 3mm P=0.75	3
y16		Washer 3x10x1t	3
y17		Tooth Lock Washer 3x6.5x0.45t	8
ELECTRICAL PARTS			
61	4-300T-03200	Power Trans	1
62	4-243T-77172	Power Supply Cord	1
63	4-257T-34801	Antenna Coil Ass'y, AM	1
64	4-222T-79400	Variable Resistor 10K-L, Output	1
65	4-235T-69300	Socket RCA Pin x 2, Output	1
66	4-235T-56500	Socket	1
67	4-231T-53677	Switch	1
80	4-233T-10471	Flexible P.C. Board	1
92	4-235T-76400	Socket 1P	1
TUNER PCB ASS'Y			
81	141-4-233T-16700	P.C. Board Ass'y, Tuner	1
L102	4-265T-03700	VHF Coil	1
L103	4-265T-53400	VHF Coil	1
L104	4-265T-53500	VHF Coil	1
L106	4-265T-03900	VHF Coil	1
L105	4-253R-70900	Choke Coil	1
L201	4-252T-08614	Choke Coil	1
T201	4-256T-05140	IFT	1
T202	4-256T-10171	IFT	1
T203	4-256T-10271	IFT	1
T404	4-256T-16740	IFT	1
T205	4-256T-16840	IFT	1
L202	4-253T-09900	Filter	1
L108	4-258T-26140	OSC Coil	1
VC1-6	4-224T-11100	Variable Capacitor	1
CT-4	4-224T-08800	Trimmer	1
T301,302	4-255T-01300	MX Coil	2
R350,228	4-222T-39474	Semifixed Variable Resistor 5K-B	2
R222,234 345	4-222T-39475	Semifixed Variable Resistor 10K-B	3
R209,225	4-222T-39477	Semifixed Variable Resistor 50K-B	2
R325,327	4-222T-39480	Semifixed Variable Resistor 500K-B	2
	4-236T-10273	Plug	1
	141-2-322T-54000	Shield Plate	1
	141-2-322T-40800	Shield Plate	1
CF201 202	4-256T-80580	IF Filter	2
CF203 204	4-256T-81080	IF Filter	2
CF205	4-256T-80971	IF Filter	1
	4-238T-05100	Push Switch, IF	1
	4-238T-05200	Push Switch, Muting	1
	4-238T-05300	Push Switch, Quartz, Rec. Level	1
B101	123-2-471R-10900	Core	1
Q101		Transistor FET 3SK59	1

PARTS LIST

Key No.	Part No.	Description	Q'ty
TUNER PCB ASS'Y			
Q105		Transistor FET 2SK61	1
Q102,104 106		Transistor 2SC535	3
Q103,107		Transistor 2SC930 Conv	2
Q201,202		Transistor 2SC930 IF	2
Q303,304		Transistor 2SA826	2
Q307		Transistor 2SC945	1
Q305,306		Transistor 2SD655	2
Q206,301 302		Transistor 2SC536	3
D203		Diode MA26	1
D201,204 205,301 302,304 305,306 307,202 309,310		Diode 1S2473	12
D101		Diode 1S553	1
Q203		IC LA1231N	1
Q108		IC LA1240	1
Q204		IC LB1416	1
Q308		IC HA1196	1
Q310		IC RC4558P	1
Q309		IC TC4011 BP	1
	RESISTORS		
R104,143 145		Carbon 10 ohm ±5% ¼W	3
R119,130 122		Carbon 100 ohm ±5% ¼W	3
R148,118 146		Carbon 100 ohm ±5% ¼W	3
R105,120 133		Carbon 220 ohm ±5% ¼W	3
R206,236		Carbon 270 ohm ±5% ¼W	2
R205,217 212		Carbon 330 ohm ±5% ¼W	3
R210,232 126		Carbon 330 ohm ±5% ¼W	3
R244		Carbon 330 ohm ±5% ¼W	1
R213,332		Carbon 1K ohm ±5% ¼W	2
R346,124		Carbon 1K ohm ±5% ¼W	2
R117,235		Carbon 1K ohm ±5% ¼W	2
R132		Carbon 1.5K ohm ±5% ¼W	1
R211,208		Carbon 1.8K ohm ±5% ¼W	2
R218,348 349,201 207,246		Carbon 2.2K ohm ±5% ¼W	6
R223,113		Carbon 2.2K ohm ±5% ¼W	2
R308,309 127,320 321,109 204		Carbon 3.3K ohm ±5% ¼W	7
R334,335		Carbon 3.3K ohm ±5% ¼W	2
R224		Carbon 3.9K ohm ±5% ¼W	1
R347,342		Carbon 4.7K ohm ±5% ¼W	2
R203		Carbon 8.2K ohm ±5% ¼W	1
R108,202 315		Carbon 5.6K ohm ±5% ¼W	3
R316		Carbon 5.6K ohm ±5% ¼W	1
R106,112 365		Carbon 10K ohm ±5% ¼W	3
R221,238		Carbon 10K ohm ±5% ¼W	2
R233,231 128		Carbon 10K ohm ±5% ¼W	3
R111,226 354		Carbon 10K ohm ±5% ¼W	3
R116,240		Carbon 15K ohm ±5% ¼W	2
R303,302		Carbon 18K ohm ±5% ¼W	2
R115		Carbon 8.2K ohm ±5% ¼W	1
R216,353		Carbon 22K ohm ±5% ¼W	2
R317,344 341		Carbon 22K ohm ±5% ¼W	3
R129,219		Carbon 22K ohm ±5% ¼W	2
R215,304 305		Carbon 27K ohm ±5% ¼W	3
R313,310		Carbon 33K ohm ±5% ¼W	2
R107		Carbon 10K ohm ±5% ¼W	1
R114		Carbon 5.6 ohm ±5% ¼W	1

Key No.	Part No.	Description	Q'ty
TUNER PCB ASS'Y			
	RESISTORS		
R103,306 307		Carbon 47K ohm ±5% ¼W	3
R243		Carbon 47K ohm ±5% ¼W	1
R355,352 343,245		Carbon 56K ohm ±5% ¼W	4
R311,220 241		Carbon 56K ohm ±5% ¼W	3
R314,356		Carbon 82K ohm ±5% ¼W	2
R101,322 331		Carbon 100K ohm ±5% ¼W	3
R336,337 149		Carbon 100K ohm ±5% ¼W	3
R333,351 360		Carbon 100K ohm ±5% ¼W	3
R323,319 318		Carbon 100K ohm ±5% ¼W	3
R316,242 110		Carbon 100K ohm ±5% ¼W	3
R239,357 358,359		Carbon 100K ohm ±5% ¼W	4
R312,366		Carbon 150K ohm ±5% ¼W	2
R362		Carbon 220K ohm ±5% ¼W	1
R102,329		Carbon 330K ohm ±5% ¼W	2
R330,324		Carbon 330K ohm ±5% ¼W	2
R147		Carbon 22K ohm ±5% ¼W	1
R361		Carbon 100K ohm ±5% ¼W	1
R144		Carbon 100 ohm ±5% ¼W	1
R328		Carbon 270K ohm ±5% ¼W	1
R326		Carbon 560K ohm ±5% ¼W	1
R214,125		Solid 56 ohm ±10% ½W	2
R237,301		Solid 56 ohm ±10% ½W	2
	CAPACITORS		
C140		Ceramic 1pF 50V ±0.25pF	1
C110,115		Ceramic 2pF 50V ±0.25pF	2
C101		Ceramic 18pF 50V ±10%	1
C106,107		Ceramic 22pF 50V ±10%	2
C116		Ceramic 22pF 50V ±5%	1
C109		Ceramic 4pF 50V ±0.25pF	1
C123,124		Ceramic 6pF 50V ±0.25pF	2
C119		Ceramic 8pF 50V ±0.25pF	1
C118		Ceramic 33pF 50V 5%	1
C102,108		Ceramic 0.001μF 50V ±10%	2
C103,104 112		Ceramic 0.01μF 50V +80–20%	3
C113,120		Ceramic 0.01μF 50V +80–20%	2
C204,205 202		Ceramic 0.01μF 50V +80–20%	3
C201,105 209		Ceramic 0.01μF 50V +80–20%	3
C138		Ceramic 0.01μF 50V +80–20%	1
C125,203 207,114		Ceramic 0.022μF 50V +80–20%	4
C208,220		Ceramic 0.022μF 50V +80–20%	2
C221,222 223		Ceramic 0.047μF 50V +80–20%	3
C227,229 211		Ceramic 0.047μF 50V +80–20%	3
C213,214 232		Ceramic 0.047μF 50V +80–20%	3
C301		Ceramic 0.047μF 50V +80–20%	1
C216		Ceramic 33pF 50V ±10%	1
C230		Ceramic 68pF 50V ±5%	1
C111		Ceramic 220pF 50V ±10%	1
C126,128		Mylar 0.001μF 50V ±20%	2
C234		Mylar 0.001μF 50V ±20%	1
C309,330		Mylar 0.0012μF 50V ±10%	2
C321		Mylar 0.0027μF 50V ±5%	1
C127,132 231,129		Mylar 0.01μF 50V ±20%	4
C303		Mylar 0.022μF 50V ±20%	1
C233		Mylar 0.033μF 50V ±20%	1
C304		Mylar 0.047μF 50V ±20%	1
C235		Mylar 0.068μF 50V ±20%	1
C328,329		Mylar 0.0047μF 50V ±10%	2
C332		Mylar 0.001μF 50V ±5%	1
C130		Styrol 330pF 125V ±5%	1
C305		Styrol 360pF 15V ±5%	1

PARTS LIST

Key No.	Part No.	Description	Q'ty
TUNER PCB ASS'Y			
	CAPACITORS		
C317,217 219,239		Electrolytic 0.47μF 50V	4
C212,224 215		Electrolytic 0.47μF 50V	3
C307,326 325		Electrolytic 1μF 50V	3
C218		Electrolytic 2.2μF 16V	1
C225,306		Electrolytic 3.3μF 16V	2
C226,237 319		Electrolytic 4.7μF 16V	3
C315,316		Electrolytic 1μF 50V	2
C238,228 311		Electrolytic 10μF 16V	3
C312,313 314		Electrolytic 10μF 16V	3
C236		Electrolytic 100μF 16V	1
C210		Electrolytic 220μF 16V	1
C302		Electrolytic 470μF 16V	1
C320		Electrolytic 100μF 10V	1
LAMP PCB ASS'Y			
82	141-4-233T-16900	P.C. Board Ass'y, Lamp	1
	4-612T-13700	Lamp	1
LED PCB ASS'Y			
83	141-4-233T-17000	P.C. Board Ass'y, LED	1
LED1,2,3		LED PR2434D Red	3
LED6		LED PG 2434DY Green	1
LED4,5		LED PR5532T Red	2
	4-235T-76400	Socket	1
	RESISTORS		
R340		Carbon 560 ohm ±5% ¼W	1
R338,339		Carbon 2.2K ohm ±5% ¼W	2
POWER PCB ASS'Y			
84	141-4-233T-17100	P.C. Board Ass'y, Power	1
	141-2-368T-18600	Heat Sink	2
Q705,706		Transistor 2SA826	2
Q701,707		Transistor 2SD386	2
Q702,703		Transistor 2SC536	2
Q704		Transistor 2SB598	1
D701		Diode WZ130	1
D702		Diode XZ057	1
D705,706 707		Diode 1S2473	3
D703		Diode DS131 A	1
D704		Diode DS132 A	1
	141-2-243T-09800	Base	2
	141-2-327T-18200	Insulator	2
	4-234T-06071	Fuse 1.6A	1
	141-2-381T-04200	Bracket, Fuse	2
	141-6-476T-12500	Indication Label, Fuse	1
	RESISTORS		
R703		Carbon 820 ohm ±5% ¼W	1
R701		Carbon 1K ohm ±5% ¼W	1
R709		Carbon 2.2K ohm ±5% ¼W	1
R706		Carbon 8.2K ohm ±5% ¼W	1
R704,705 710		Carbon 22K ohm ±5% ¼W	3
R707,711 713		Carbon 100K ohm ±5% ¼W	3
R702		FP-Carbon 3.9 ohm ±5% ½W	1
R712		FP-Carbon 10 ohm ±5% ½W	1
R708		Metal 33 ohm ±5% 2W	1

Key No.	Part No.	Description	Q'ty
POWER PCB ASS'Y			
	CAPACITORS		
C701,702 703		Ceramic 0.01μF 50V +80—20%	3
C704		Ceramic 0.01μF 50V +80—20%	1
C708		Electrolytic 0.47μF 50V	1
C709		Electrolytic 100μF 10V	1
C706		Electrolytic 220μF 16V	1
C710		Electrolytic 470μF 10V	1
C707		Electrolytic 1000μF 16V	1
C705		Electrolytic 2200μF 25V	1
SWITCH PCB ASS'Y			
85	141-4-233T-17200	P.C. Board Ass'y, Switch	1
S701	4-231T-76472	Switch	1
C711	4-223T-04700	Capacitor	1
DISPLAY PCB ASS'Y			
86	141-4-233T-17300	P.C. Board Ass'y, Display	1
	4-985T-01200	Fluorescent Display	1
	4-236T-14282	Plug 7P	2
	4-236T-14275	Plug 18P	1
	141-2-447T-70400	Cushion	1
	141-2-210T-16900	Bracket	1
QUARTS PCB ASS'Y			
87	141-4-233T-08801	P.C. Board Ass'y, Quartz	1
CT401	4-224T-07300	Trimmer	1
	4-225T-02600	Crystal	1
R472,470	4-222T-39575	Variable Resistor	2
L401	4-252T-08608	Choke	1
L402,403 404	4-252T-08620	Choke	3
	141-2-322T-53200	Shield Plate	1
	141-2-322T-53300	Shield Plate	1
Q401		Transistor 2SC535	1
Q418		Transistor 2SC536	1
Q402 403,412		Transistor 2SC930 Conv.	3
Q407,413 415		Transistor 2SC536	3
Q416,417		Transistor 2SC536	2
Q404,405 409		Transistor FET 2SK 30	3
Q414		Transistor 2SA826	1
D401,402 404,405 407,408 410,411 412,413 414,415 417,418 419,420 425		Diode 1S2473	17
D426		Diode YZ047	1
D427		Diode YZ060	1
Q406,408		IC RC4558P	2
Q414		IC TC4049P	1
Q410		IC SN74S03	1
Q411		IC TC5048P	1
	RESISTORS		
R408		Carbon 22 ohm ±5% ¼W	1
R412,440		Carbon 56 ohm ±5% ¼W	2
R414		Carbon 220 ohm ±5% ¼W	1
R437		Carbon 330 ohm ±5% ¼W	1
R476,438 473		Carbon 1K ohm ±5% ¼W	3
R401		Carbon 100 ohm ±5% ¼W	1

PARTS LIST

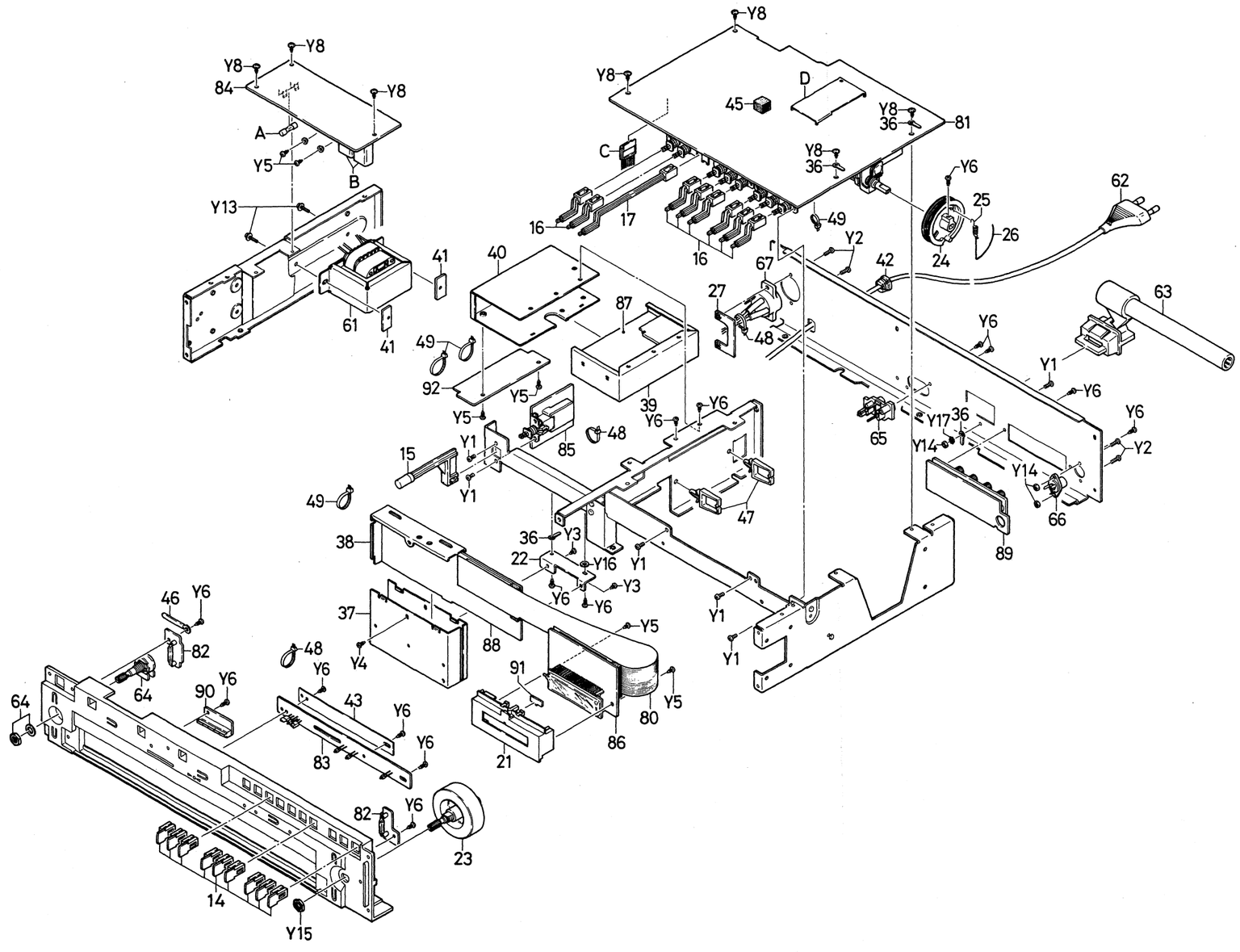
Key No.	Part No.	Description	Q'ty
QUARTS PCB ASS'Y			
	RESISTORS		
R406,423 453		Carbon 1K ohm ±5% ¼W	3
R404		Carbon 1.8K ohm ±5% ¼W	1
R428		Carbon 2.2K ohm ±5% ¼W	1
R413,416		Carbon 4.7K ohm ±5% ¼W	2
R403,409 420		Carbon 5.6K ohm ±5% ¼W	3
R466		Carbon 5.6K ohm ±5% ¼W	1
R422,432 431		Carbon 10K ohm ±5% ¼W	3
R459,458 435		Carbon 10K ohm ±5% ¼W	3
R462,463 436		Carbon 10K ohm ±5% ¼W	3
R451,446		Carbon 10K ohm ±5% ¼W	2
R407		Carbon 3.3K ohm ±5% ¼W	1
R448		Carbon 15K ohm ±5% ¼W	1
R460,452 455		Carbon 22K ohm ±5% ¼W	3
R465,464		Carbon 27K ohm ±5% ¼W	2
R426,449		Carbon 56K ohm ±5% ¼W	2
R461,443 417,450		Carbon 56K ohm ±5% ¼W	4
R447		Carbon 100K ohm ±5% ¼W	1
R410		Carbon 330 ohm ±5% ¼W	1
R456,457		Carbon 100K ohm ±5% ¼W	2
R442,475		Carbon 100K ohm ±5% ¼W	2
R441,477 479		Carbon 100K ohm ±5% ¼W	3
R425		Carbon 1M ohm ±5% ¼W	1
R429		Carbon 270K ohm ±5% ¼W	1
R474,424		Carbon 560K ohm ±5% ¼W	2
R405		Carbon 560 ohm ±5% ¼W	1
R434		Carbon 220K ohm ±5% ¼W	1
R445		Carbon 330K ohm ±5% ¼W	1
R482		Carbon 1.5M ohm ±5% ¼W	1
R421		Carbon 10K ohm ±5% ¼W	1
R419		Carbon 56K ohm ±5% ¼W	1
R480		Carbon 100K ohm ±5% ¼W	1
R416		Carbon 47K ohm ±5% ¼W	1
R402		Carbon 6.8K ohm ±5% ¼W	1
	CAPACITORS		
C401		Ceramic 0.001μF 50V ±10%	1
C402		Ceramic 0.01μF 50V +80–20%	1
C422,431 432,440		Ceramic 0.022μF 50V +80–20%	4
C405,430 433		Ceramic 0.047μF 50V +80–20%	3
C404		Ceramic 8pF 50V ±0.25pF	1
C413		Ceramic 10pF 50V ±10%	1
C421		Ceramic 33pF 50V ±10%	1
C406		Ceramic 82pF 50V ±10%	1
C403,412		Ceramic 100pF 50V ±10%	2
C423		Ceramic 220pF 50V ±10%	1
C411		Mylar 0.047μF 50V ±10%	1
C416		Mylar 0.068μF 50V ±10%	1
C420,419		Electrolytic 0.47μF 50V	2
C417		Electrolytic 1μF 50V	1
C410,409		Electrolytic 1μF 50V	2
C408,428		Electrolytic 100μF 16V	2
C427		Electrolytic 100μF 10V	1
C424		Electrolytic 2.2μF 16V	1
C426		Electrolytic 3.3μF 16V	1
C407		Mylar 0.01μF 50V ±10%	1
C425		Mylar 0.0022μF 50V ±10%	1
COUNTER PCB ASS'Y			
88	141-4-233T-10201	P.C. Board Ass'y, Counter	1
L002	4-265R-05000	VHF Coil	1
R039,040	4-222T-62379	Semifixed Variable Resistor 10K	2
	4-225T-02700	Crystal	1
	4-236T-14282	Plug 7P	2
	4-236T-14275	Plug 18P	1
L003,004	4-253T-11220	Filter 10μH	2
L001	4-253T-11214	Filter 3.3μH	1
	141-2-447T-70400	Cushion	1

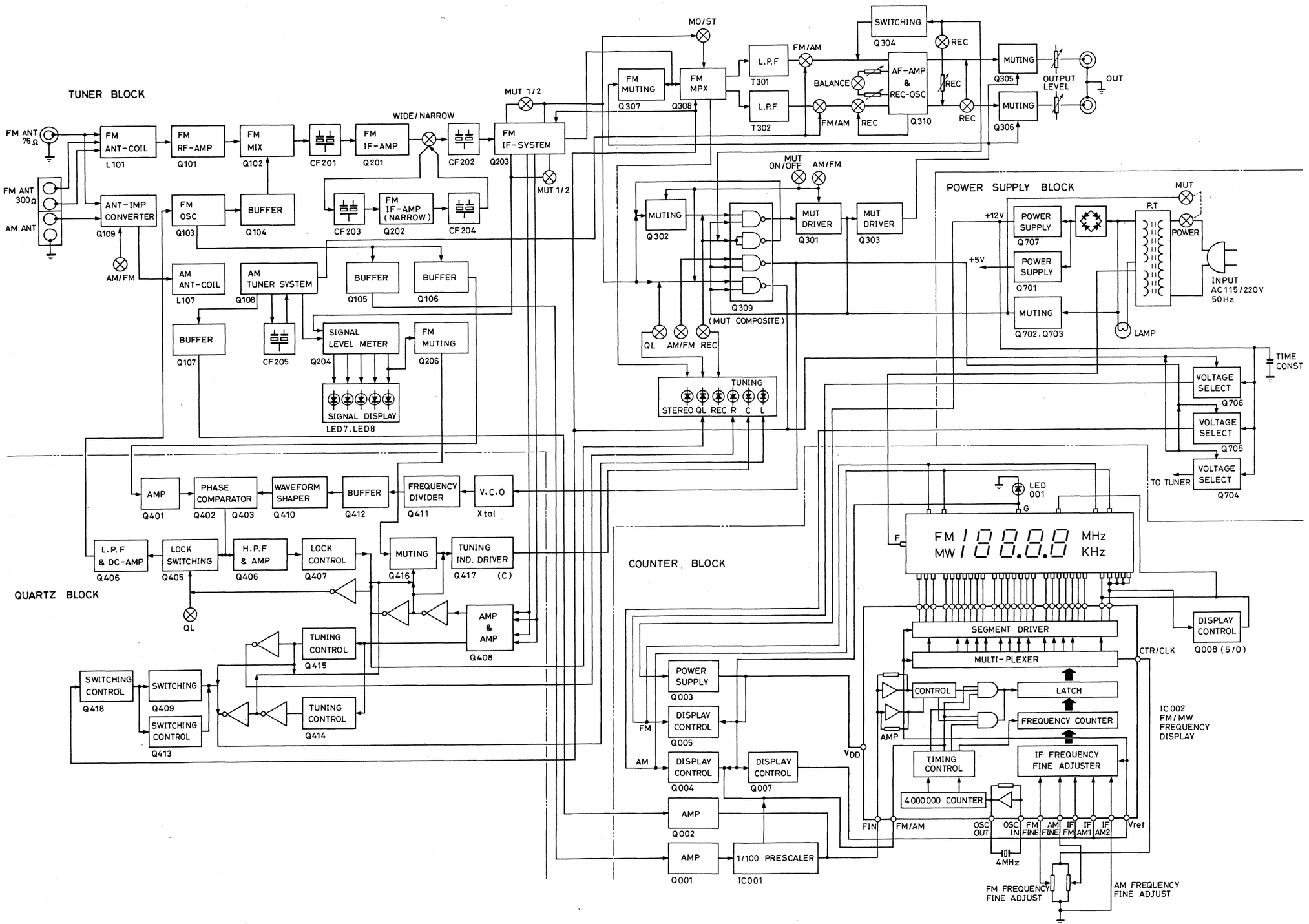
Key No.	Part No.	Description	Q'ty
COUNTER PCB ASS'Y			
Q001,002		Transistor 2SC930	2
Q004,005 007,008		Transistor 2SC536	4
Q003		Transistor 2SD438	1
D004,005 006		Diode 1S2473	3
D003		Diode XZ-100	1
IC002		IC LC7252	1
IC001		IC DS8629N	1
	RESISTORS		
R005		Carbon 10 ohm ±5% ¼W	1
R004,025		Carbon 220 ohm ±5% ¼W	2
R034,037		Carbon 270 ohm ±5% ¼W	2
R003		Carbon 560 ohm ±5% ¼W	1
R009,012		Carbon 1K ohm ±5% ¼W	2
R033		Carbon 1.2K ohm ±5% ¼W	1
R008,028		Carbon 1.5K ohm ±5% ¼W	2
R018		Carbon 2.2K ohm ±5% ¼W	1
R019		Carbon 47K ohm ±5% ¼W	1
R010		Carbon 4.7K ohm ±5% ¼W	1
R011		Carbon 5.6K ohm ±5% ¼W	1
R013		Carbon 8.2K ohm ±5% ¼W	1
R029		Carbon 12K ohm ±5% ¼W	1
R002		Carbon 15K ohm ±5% ¼W	1
R016		Carbon 27K ohm ±5% ¼W	1
R022,023		Carbon 27K ohm ±5% ¼W	2
R001,006 007		Carbon 56K ohm ±5% ¼W	3
R014,015		Carbon 100K ohm ±5% ¼W	2
R017,031 032		Carbon 100K ohm ±5% ¼W	3
R030,026 027		Carbon 100K ohm ±5% ¼W	3
R038		Solid 10 ohm ±10% ½W	1
R024		Solid 56 ohm ±10% ½W	1
R035		Carbon 10K ohm ±10% ¼W	1
R036		Carbon 56K ohm ±10% ¼W	1
	CAPACITORS		
C001,003		Ceramic 0.001μF 50V ±10%	2
C004,005 006		Ceramic 0.01μF 50V +80–20%	3
C007,012 016		Ceramic 0.01μF 50V +80–20%	3
C008,009 010,025		Ceramic 0.022μF 50V +80–20%	4
C011,013		Ceramic 0.022μF 50V +80–20%	2
C002		Ceramic 100pF 50V ±10%	1
C053		Ceramic 0.001μF 50V ±10%	1
C022,023 024,026 027,028		Ceramic 0.001μF 50V ±10%	6
C029,030 031,032 033,034		Ceramic 0.001μF 50V ±10%	6
C035,036 037,038 039,040		Ceramic 0.001μF 50V ±10%	6
C041,042 043,044 045,046		Ceramic 0.001μF 50V ±10%	6
C047,048 049,050 051,052		Ceramic 0.001μF 50V ±10%	6
C014,015		Electrolytic 4.7μ 16V	2
C020		Electrolytic 10μ 10V	1
C021		Electrolytic 10μ 16V	1

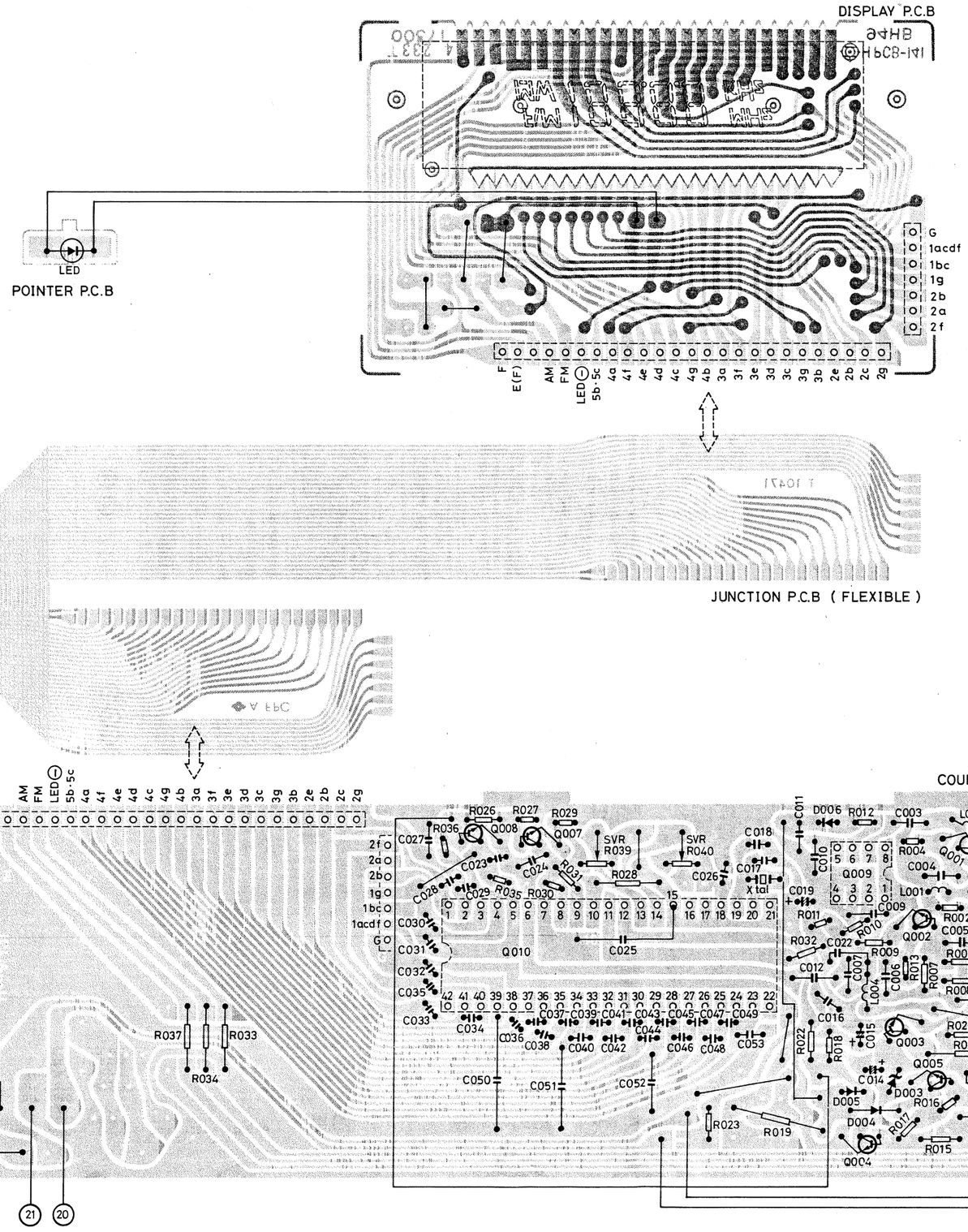
PARTS LIST

Key No.	Part No.	Description	Q'ty
ANTENNA PCB ASS'Y			
89	141-4-233T-22400	P.C. Board Ass'y, Antenna	1
L101	4-268T-00100	VHF Coil Trans	1
		Hexagon Nut 3mm	1
L109	4-253T-11220	Filter 10μH	1
L110	4-235T-11214	Filter 3.3μF	1
	141-2-382T-05900	Terminal	1
Q109		Transistor 2SC1571	1
D103,104		Diode 1S2473	2
	RESISTORS		
R140		Carbon 10K ohm ±5% ¼W	1
R139		Carbon 5.6K ohm ±5% ¼W	1
R136		Carbon 100K ohm ±5% ¼W	1
R135,134		Carbon 1K ohm ±5% ¼W	2
R142		Carbon 100 ohm ±5% ¼W	1
R138		Carbon 220 ohm ±5% ¼W	1
R137		Carbon 330 ohm ±5% ¼W	1
R141		Carbon 2.2K ohm ±5% ¼W	1
	CAPACITORS		
C135,136		Ceramic 0.01μF 50V +80–20%	2
C134		Ceramic 0.022μF 50V +80–20%	1
C139		Ceramic 220pF 50V ±10%	1
C133		Ceramic 10pF 50V ±10%	1
SIGNAL PCB ASS'Y			
90	141-4-233T-22500	P.C. Board Ass'y, Signal	1
D108		Led LD003G Green	1
D107		Led LD002G Green	1
	4-235T-70100	Socket 6P	1
POINTER PCB ASS'Y			
91	141-4-233T-22600	P.C. Board Ass'y, Pointer	1
		Led SLP103A	1

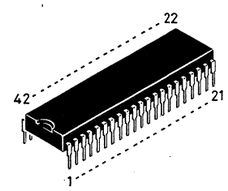
CHASSIS EXPLODED VIEW




TUNER BLOCK
FM ANT 75Ω
FM ANT 300Ω
AM ANT
FM ANT-COIL L101
FM RF-AMP Q101
FM MIX Q102
CF201
FM IF-AMP Q201
CF202
WIDE/NARROW
FM IF-SYSTEM Q203
MUT 1/2
ANT-IMP CONVERTER Q109
AM/FM
FM OSC Q103
BUFFER Q104
CF203
FM IF-AMP (NARROW) Q202
CF204
AM ANT-COIL L107
AM TUNER SYSTEM Q108
BUFFER Q105
BUFFER Q106
BUFFER Q107
CF205
SIGNAL LEVEL METER Q204
FM MUTING Q206
SIGNAL DISPLAY LED7, LED8
MO/ST
FM MUTING Q307
FM MPX Q308
L.P.F T301
L.P.F T302
FM/AM
SWITCHING Q304
BALANCE
AF-AMP & REC-OSC Q310
REC
MUTING Q305
MUTING Q306
OUTPUT LEVEL
OUT
MUT ON/OFF
AM/FM
MUTING Q302
MUT DRIVER Q301
MUT DRIVER Q303
Q309 (MUT COMPOSITE)
QL
AM/FM REC
TUNING
STEREO QL REC R C L
POWER SUPPLY BLOCK
MUT
+12V
+5V
POWER SUPPLY Q707
POWER SUPPLY Q701
MUTING Q702, Q703
P.T
POWER
INPUT AC115/220V 50Hz
LAMP
TIME CONST
VOLTAGE SELECT Q706
VOLTAGE SELECT Q705
VOLTAGE SELECT Q704
TO TUNER
AMP Q401
PHASE COMPARATOR Q402
WAVEFORM SHAPER Q403
BUFFER Q410
FREQUENCY DIVIDER Q412
V.C.O Q411
Xtal
L.P.F & DC-AMP Q406
LOCK SWITCHING Q405
H.P.F & AMP Q406
LOCK CONTROL Q407
MUTING Q416
TUNING IND. DRIVER Q417 (C)
QUARTZ BLOCK
QL
AMP & AMP Q408
TUNING CONTROL Q415
SWITCHING CONTROL Q418
SWITCHING Q409
SWITCHING CONTROL Q413
TUNING CONTROL Q414
COUNTER BLOCK
LED 001
FM 108.8 MHz
MW 108.8 KHz
SEGMENT DRIVER
MULTI-PLEXER
CONTROL
LATCH
FREQUENCY COUNTER
AMP
TIMING CONTROL
IF FREQUENCY FINE ADJUSTER
4000000 COUNTER
DISPLAY CONTROL Q008 (5/0)
CTR/CLK
IC002 FM/MW FREQUENCY DISPLAY
POWER SUPPLY Q003
DISPLAY CONTROL Q005
DISPLAY CONTROL Q004
DISPLAY CONTROL Q007
AMP Q002
AMP Q001
1/100 PRESCALER IC001
FM
AM
VDD
FIN
FM/AM
OSC OUT
OSC IN
FM FINE
AM FINE
IF FM
IF AM1
IF AM2
Vref
4MHz
FM FREQUENCY FINE ADJUST
AM FREQUENCY FINE ADJUST



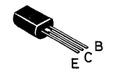
LC7252 ---Q010



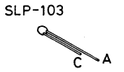
DS8629 --- Q090

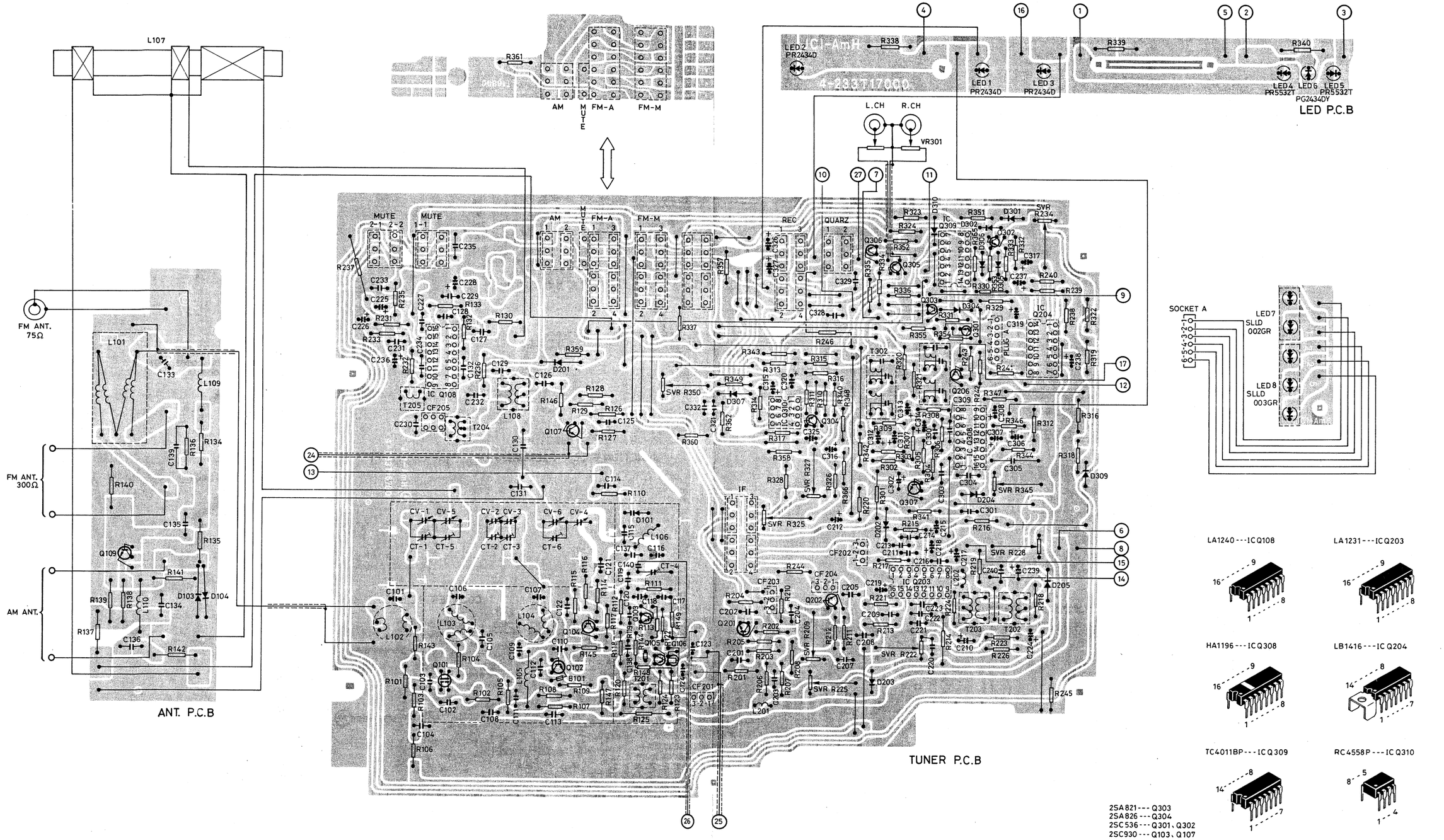
2SC930 --- Q001, Q002,
2SC536 --- Q004, Q005, Q007
Q008

2SD438 --- Q003



SLP-103





LA1240---IC Q108

LA1231---IC Q203

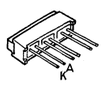
HA1196---IC Q308

LB1416---IC Q204

TC4011BP---IC Q309

RC4558P---IC Q310

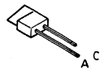
SLLD003GR---LED8



SLLD002GR---LED7

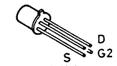
PR2434P---LED1, LED2 LED3, LED4

PR5532T---LED4, LED5

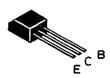


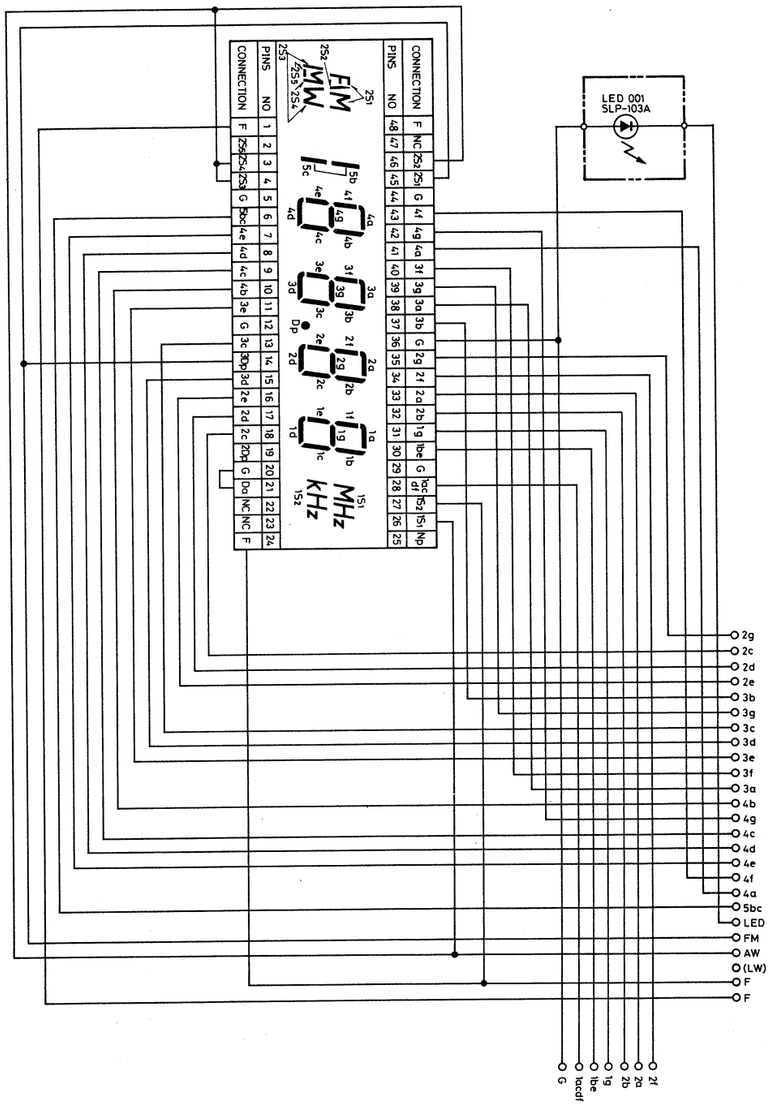
2SA821---Q303
2SA826---Q304
2SC536---Q301, Q302
2SC930---Q103, Q107 Q201, Q202
2SC945---Q307
2SC1571---Q109
2SD655---Q305, Q306

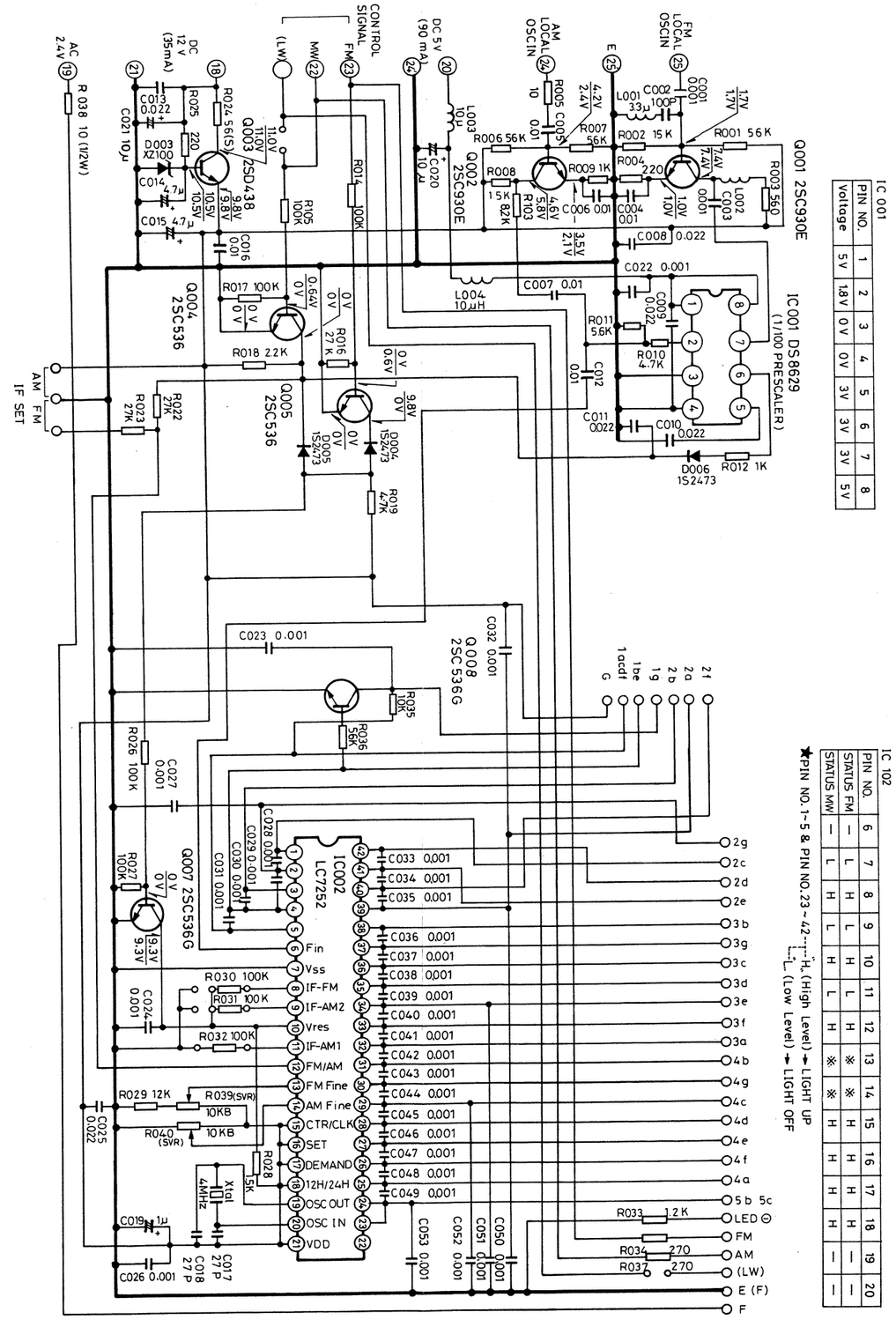
3SK59---Q101



2SC535---Q102, Q104, Q105 Q106, Q206







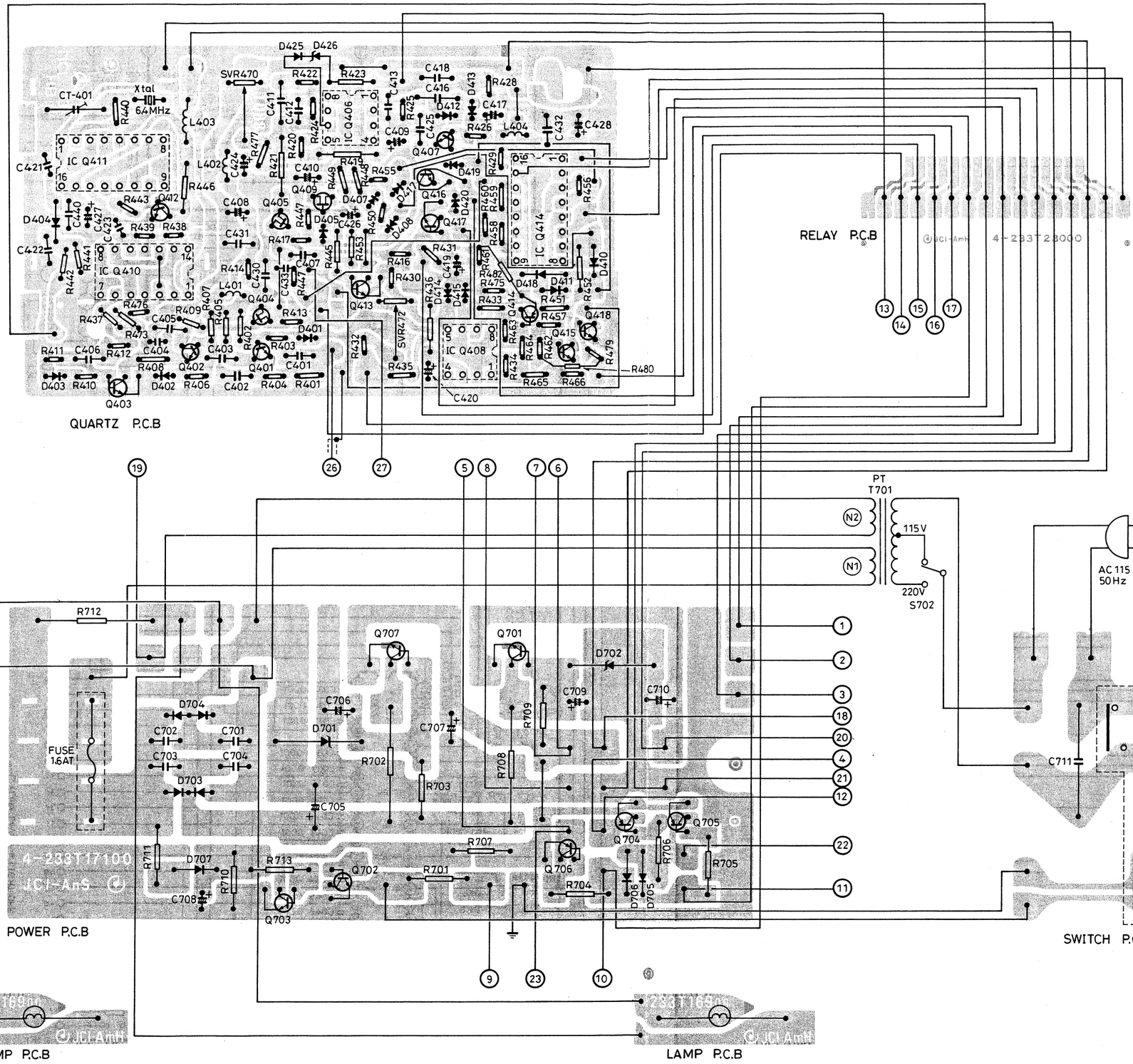
IC 001

PIN NO.	1	2	3	4	5	6	7	8
Voltage	5V	1.8V	0V	0V	3V	3V	3V	5V

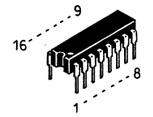
IC 102

PIN NO.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STATUS FM	—	L	H	L	H	L	H	※	※	H	H	H	H	—	—
STATUS MW	—	L	H	L	H	L	H	※	※	H	H	H	H	—	—

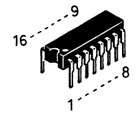
★PIN NO. 1-5 & PIN NO. 23~42 ····· H (High Level) → LIGHT UP
L (Low Level) → LIGHT OFF



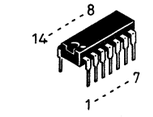
TC5048P---IC Q411



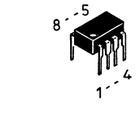
TC4049P---IC Q414



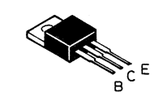
SN74S03---IC Q410



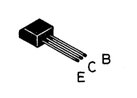
RC4558P---IC Q406, IC Q408



2SD386---Q701, Q707

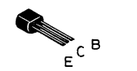


2SC535---Q401



2SK30---Q404, Q405, Q409

2SA826---Q414, Q705, Q706
2SB598---Q704
2SC536---Q407, Q413, Q415
Q416, Q417, Q418
Q702, Q703
2SC930---Q402, Q403, Q412



SCHEMATIC DIAGRAM (TUNER)

Tr. NO	Q101		Q102	Q103	Q104	Q105	Q106	Q107	Q109
	FM		FM	FM	FM	FM	FM	AM	AM
B	(G1)	(G2)	4.1V	4.3V	5.3V	3.7V	(G) 0V	3.8V	7.4V
	0V	4.2V							
C	(D) 9.8V		11.6V	8.8V	8.6V	8.8V	(D) 8.9V	12.3V	11.8V
E	(S) 0V		3.5V	3.7V	4.5V	3.0V	(S) 0V	3.2V	6.8V

Tr. NO	Q201	Q202	Q206	
	FM	FM		
B	NARROW	WIDE	SIGNAL ⓘ ON	NON SIGNAL
	4.9V	3.9V	0.6V	0 V
C	NARROW	WIDE	SIGNAL ⓘ ON	NON SIGNAL
	11.8V	7.9V	0 V	0.6V
E	NARROW	WIDE	SIGNAL ⓘ ON	NON SIGNAL
	4.3V	3.2V	0 V	0 V

Tr. NO	Q301		Q302		Q303		Q304		Q305		Q306		Q307	
	FM	AM	FM	AM	FM	AM	FM	AM	FM	AM	FM	AM	FM	AM
B	MUTE OFF	0V	0V	0V	0V	12.7V	12.7V	REC OFF	11V	—	0V	0V	0V	0V	—
	MUTE ON	8.6V	0V	0.6V	0V	12.1V	12.7V	REC ON	5.1V	—	0.7V	0V	0.7V	0V	0.7V
C	MUTE OFF	12.8V	12.8V	12.4V	12.4V	12.4V	0 V	REC OFF	6.4V	—	0V	0V	0V	0V	0V
	MUTE ON	0V	12.8V	0V	12.4V	12.6V	0V	REC ON	5.7V	—	0V	0V	0V	0V	0V
E	MUTE OFF	0V	0V	0V	0V	12.8V	—	REC OFF	6.4V	5.8V	0V	0V	—	—	0V	0V
	MUTE ON	0V	0V	0V	0V	12.8V	—	REC ON	6.4V	5.8V	0V	0V	—	—	0V	0V

Q108

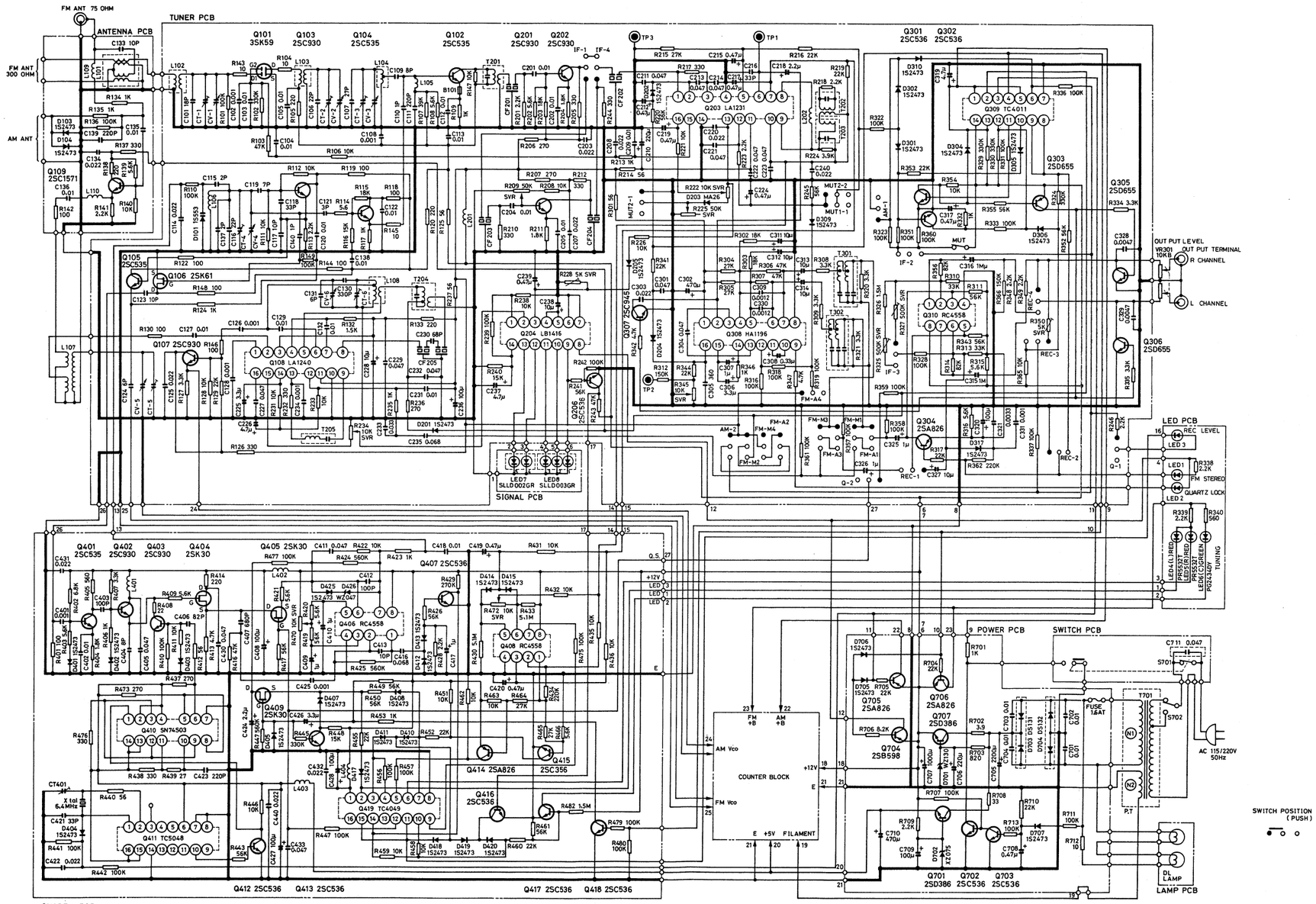
PIN NO	1	2	3	4	5	6	7	8
A M	4.7V	1.7V	10.9V	8.8V	12.0V	3.4V	1.3V	2.7V
PIN NO	16	15	14	13	12	11	10	9
A M	1.3V	0 V	1.6V	0.7V	1.6V	12.1V	0 V	8.7V

Q203

PIN NO	1	2	3	4	5	6	7	8
F M	FM 2.8V	AM 3.0V	FM 2.8V	AM 3.5V	FM 2.8V	AM 3.0V	0 V	MUTE ON 1.8V	5.6V	5.5V	5.5V
PIN NO	16	15	14	13	12	11	10	9
F M	0.4V	5.0V	0 V	0.4V	4.9V	11.6V	5.5V	5.5V

Q204

PIN NO	1	2	3	4	5	6	7
SIGNAL ⓘ ON	0.1V	0 V	0.1V	2.7V	2.7V	0 V	0 V
SIGNAL ⓘ ON	0.7V	0 V	0.7V	2.7V	2.7V	0 V	0 V
PIN NO	14	13	12	11	10	9	8
SIGNAL ⓘ ON	0.5V	0.1V	0.1V	0.1V	2.1V	12.8V	
SIGNAL ⓘ ON	7.7V	2.1V	2.1V	2.3V	2.1V	2.1V	12.7V



Q308

PIN NO	1	2	3	4	5	6	7	8
F M	11.7V	3.1V	8.0V	9.0V	9.0V	4.0V	4.0V	0V
PIN NO	16	15	14	13	12	11	10	9
F M	FM 3.2V	AM 5.3V	2.4V	2.4V	FM 2.3V	AM 2.4V	FM 0.7V	ST 0V	2.4V	0 V	11.3V

Q309

PIN NO	1	2	3	4	5	6	7
MUTE OFF	12.6V	0 V	12.8V	0.3V	12.6V	12.7V	0 V
MUTE ON	12.5V	A M 12.8V	A M 0.3V	A M 12.5V	—	A M 0.5V	—
PIN NO	14	13	12	11	10	9	8
MUTE OFF	12.8V	12.6V	12.6V	0V	0 V	9.4V	9.4 V
MUTE ON	—	—	—	12.7V	REC CHANGE *H.	REC ON 12.4V	REC ON 12.4V

Q310

PIN NO	1	2	3	4
REC OFF	5.7V	—	5.7V	—
REC ON	6.4V	6.4V	6.3V	0V
PIN NO	8	7	6	5
REC OFF	—	7.7V	5.7V	5.7V
REC ON	12.8V	6.4V	6.4V	6.4V

Tr. NO	Q401	Q402	Q403	Q404	Q405	Q407	Q409	Q412	Q413	Q414	Q415	Q416	Q417	Q418
B	6,0V	3,5V	6,0V	G 3.6V	G 0V	0.6V	G 0V	—	0V	11.9V	0.65V	0,7V	0.6V	0.3V
C	11,1V	3.3V	3.3V	D 12.5V	D 4.2V	0V	D 4.2V	—	12 V	12V	0V	0V	10,6V	12.5V
E	5,2V	12.7V	0V	S 6.2V	S 4.2V	0V	S 12.4V	—	0V	12,5V	0 V	0V	0V	0V

Q406

PIN NO	1	2	3	4
	4.2V	4.3V	4.2V	0 V
PIN NO	8	7	6	5
	12.8V	4.2V	4.2V	4.2V

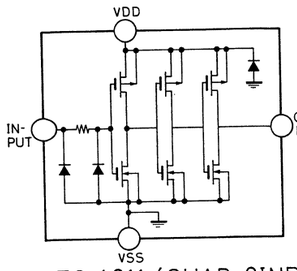
Q407

PIN NO	1	2	3	4
	1.5V	5.3V	5.1V	0V
PIN NO	8	7	6	5
	12.7V	1.5V	5.4V	5.4V

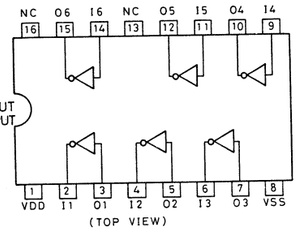
Tr. NO	Q701	Q702	Q703	Q704	Q705		Q706		Q707
					A M	FM		FM	
B	5,5V	0V	0,6V	12.1V	12.1V	12.5V	12.2V	12.7V	13.4V
C	14,2V	12.6V	0V	12.7V	A M 12.5V	1.8V	FM 12.8V	0V	17.3V
E	5,0V	0 V	0 V	12,8V	12,8V		12.8V		12.8V

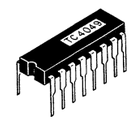
TC 4049 (HEX BUFFER / CONVERTER INVERTING TYPE) "C²MOS„

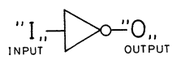
1/6 CIRCUIT DIAGRAM



BLOCK DIAGRAM





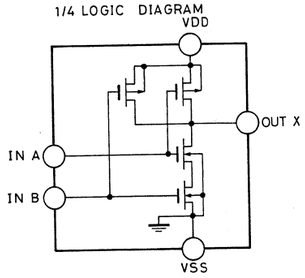


TRUTH VALUE TABLE

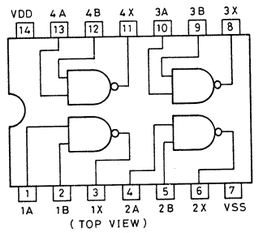
INPUT	OUTPUT
"I„	"O„
L	H
H	L

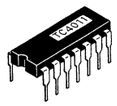
TC 4011 (QUAD 2INPUT POSITIVE NAND GATE) "C²MOS„

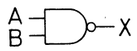
1/4 LOGIC DIAGRAM



BLOCK DIAGRAM



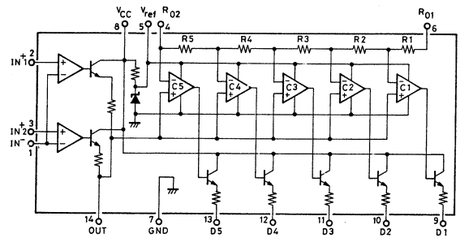


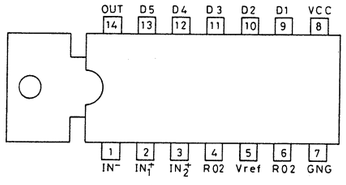


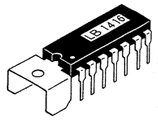
TRUTH VALUE TABLE

INPUT		OUTPUT
A	B	X
L	L	H
L	H	H
H	L	H
H	H	L

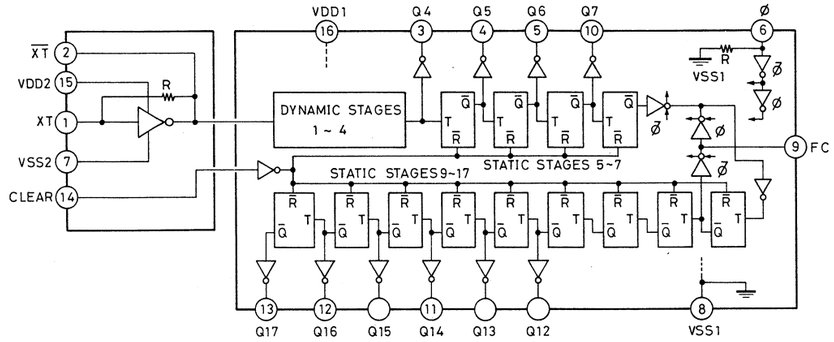
LB 1416 (5 DIGIT LEVEL METER ➡ LED)

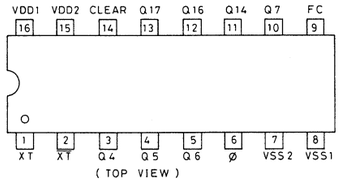


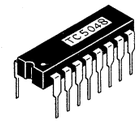




TC 5048 (17 STAGE HIGH SPEED FREQUENCY DIVIDER)

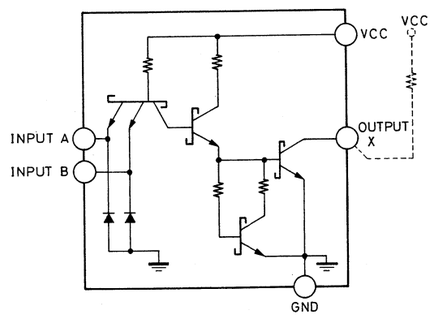


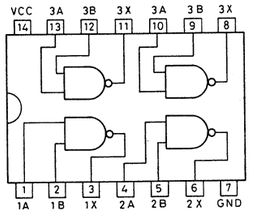




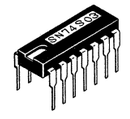
SN 74S03 (QUAD 2INPUT POSITIVE NAND GATE OPEN COLLECTOR OUTPUT TYPE) "TLL„

1/4 SCHEMATICS

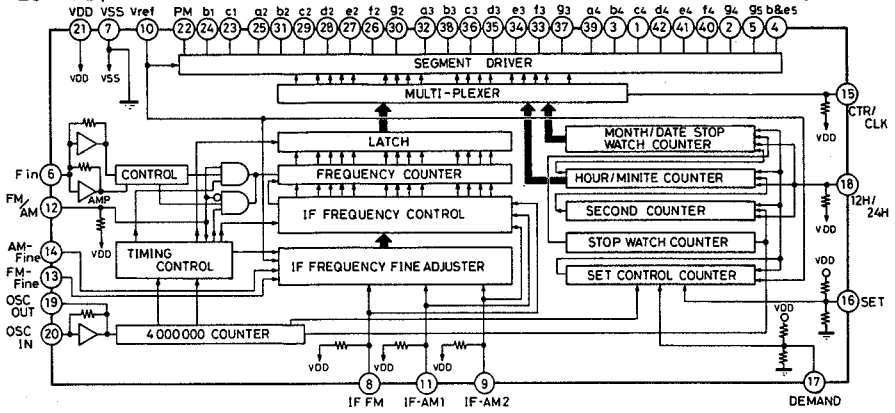


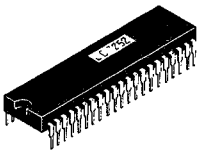


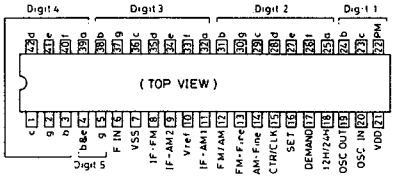
INPUT		OUTPUT
A	B	X
L	L	H
L	H	H
H	L	H
H	H	L



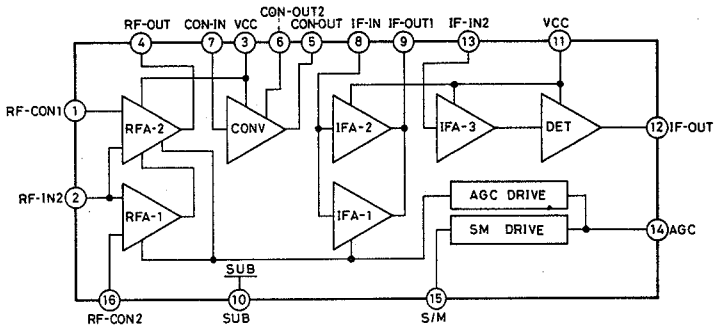
LC7252 (5 DIGIT FREQUENCY DISPLAY WITH CLOCK➔FLUORESCENT DRIVER)

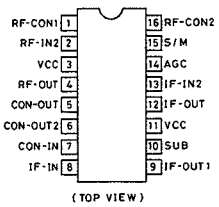


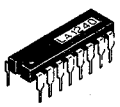




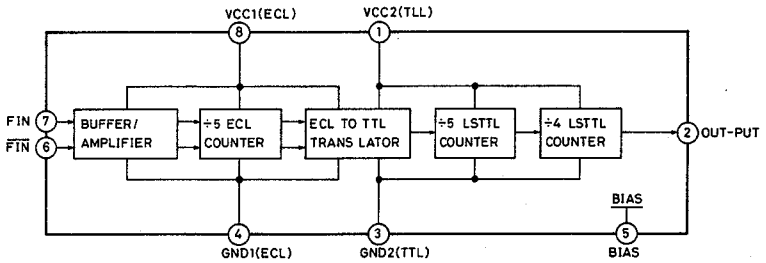
LA1240 (AM TUNER SYSTEM)

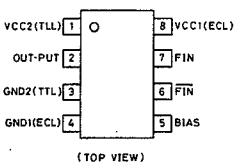




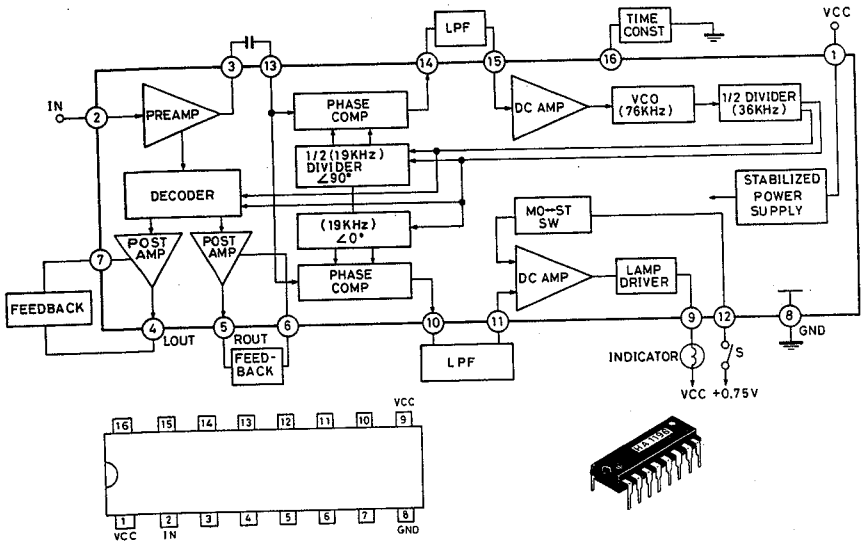


DS 8629 (135MHz DIVIDE-BY-100 PRESCALER) "ECL & TTL"

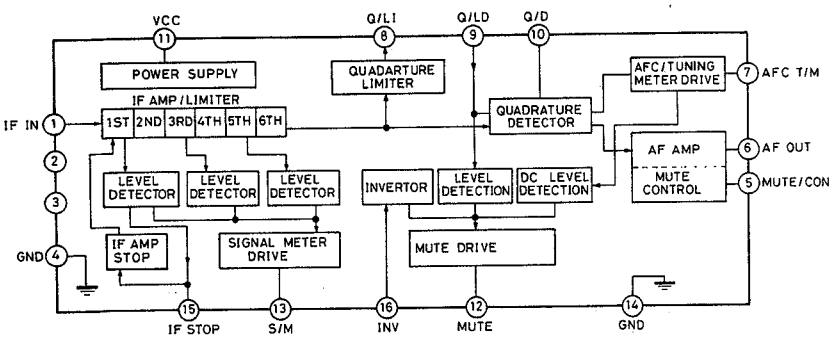


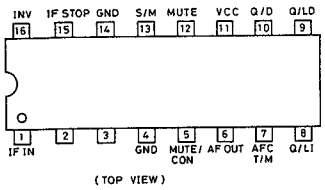


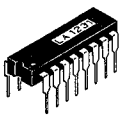
HA1196 (PLL FM STEREO DEMODULATOR)



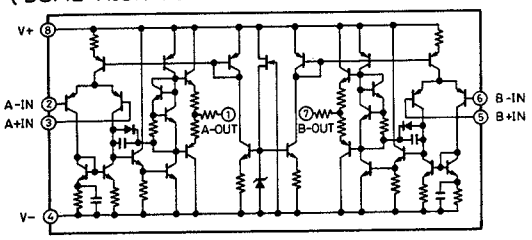
LA1231 (FM IF SYSTEM)

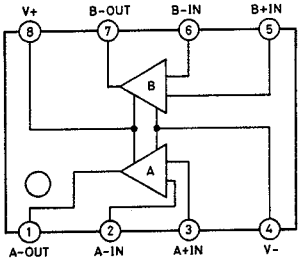


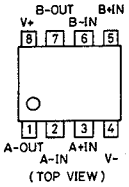




NJM4558, RC4558
(DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS)







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570 Japan

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